MYCOLOGIA

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PHOTOGRAPHS AND DESCRIPTIONS OF CUP-FUNGI—XIII. SUBHYPOGEOUS FORMS [1]

FRED J. SEAVER

(WITH PLATES 22 AND 23)

There are a number of species of cup-fungi which during their early stages are submerged or nearly so in the humus or sand in which they grow. For the most part these species are placed in one of two genera *Sepultaria* and *Sarcosphaera*. The former genus is distinguished by the growth of long dark colored hairs on the outside of the apothecia in which character they resemble the plants of the genus *Patella*. The plants of the latter genus are devoid of hairs and in this character resemble those of the genus *Peziza*. Five species of *Sepultaria* are recognized in North American Cup-fungi, one of which is illustrated (PLATE 13). Of the five species, three are characterized by having a whitish or creamy-white hymenium while in the other two the hymenium is orange or yellow.

SEPULTARIA AURANTIA

During the past summer while collecting with Mr. Shope of the University of Colorado, a large quantity of plants belonging to the genus *Sepultaria* and having the orange colored hymenium were collected. These were referred to *Sepultaria aurantia* Clements which was described from material collected in Nebraska. Our plants agreed well with his description but later comparison with a fragment supposed to be a part of the type of

[1] This paper is supplementary to The North American Cup-fungi (Operculates) which was published by the author and issued December, 1928.

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Clement's species showed the spores in the Colorado specimens considerably larger. However, in view of the fact that the spores of these plants conform fairly well with his description it is possible that the material might have been mixed and we for the present refer our Colorado plants to the name assigned by Clements and publish at this time an excellent photograph made by Mr. Shope. These plants are at first entirely submerged but gradually emerge as they mature. The hymenium is yellow but becomes decidedly orange as the plants are dried out.

SEPULTARIA ARENICOLA

Recently an excellent photograph of *Sepultaria arenicola* was sent to the writer by Mr. S. C. Edwards of Colton, California. Since this species was not illustrated in North American Cup-fungi we reproduce it, with Mr. Edwards' permission, at this time. As will be noted the margins of the cups are sometimes entire and in other cases they split like the peridium of a *Geaster*. The hymenium in this species is creamy-white.

SARCOSPHAERA FUNERATA

Several years ago Mr. H. C. Beardslee sent the writer a collection of cup-fungi obtained by him in Florida and growing immersed in the sand. The species was not identified at the time and was overlooked so that no record of it appeared in North American Cup-fungi. Recently, however, the author has identified the species as *Peziza funerata* Cooke and the description and synonomy is appended as follows:

Sarcosphaera funerata (Cooke) Seaver, comb. nov.
Peziza funerata Cooke, Grevillea **6**: 142. 1878.

Apothecia scattered, at first entirely immersed in the sand, appearing as holes in the ground with the irregular or slightly star-shaped margin appearing above the surface of the sandy soil, reaching a diameter of 2–3 cm., externally pitted from the adhering particles of sand; hymenium exposed at maturity, dull umber-brown; asci cylindric with an abrupt base, reaching a length of 275 μ and a diameter of 12–14 μ; spores ellipsoid smooth 8–9 $\times$ 16–18; paraphyses slender slightly enlarged above, clinging together and not very distinct, brown.

In sandy soil.

TYPE LOCALITY: Florida.

DISTRIBUTION: Florida and Michigan; also in Australia?

ILLUSTRATIONS: Cooke, Mycographia *pl. 107, f. 380.*

The following field notes were supplied by the collector: "The plant grows in the bare sand in cultivated orange groves. It is immersed in the sand and only the irregularly star-shaped opening shows. The shape is roughly globose with the mouth constricted and somewhat star-shaped. Apparently it is at first closed and the mouth opens as it develops, as the interior is entirely free from sand unless it is washed in by rain. The color is dull umber throughout. When they are appearing you will see in the grove, here and there, the irregular opening of the mouth in the white sand. I have found them in January and February here in New Suryma.

A few small specimens of this species were also sent to the writer by Dr. Edwin E. Honey from Albion, Michigan, growing on sandy soil. Also one specimen from Melbourne, Australia, was obtained from the collection of the late C. G. Lloyd which seems to conform with the species giving it rather a wide distribution although it has been but seldom collected.

SARCOSPHAERA CORONARIA

The accompanying photographs of *Sarcosphaera coronaria* (Jacq.) Schröt., were made from material collected by S. H. Burnham in Washington County, New York. This species is characterized by its delicately violet-colored hymenium. It is a large species of partially submerged *Peziza* and frequently collected and illustrated in Europe, although only few collections from this country have been seen.

THE NEW YORK BOTANICAL GARDEN

EXPLANATION OF PLATES

PLATE 22

Upper figure. *Sepultaria aurantia.* Photograph of a cluster of apothecia at various stages of development, about natural size. Photograph by Mr. Paul F. Shope. Left, drawing of a portion of an ascus with spores and the tip of a paraphysis. Right, drawing of one of the hairs from the outside of an apothecia.

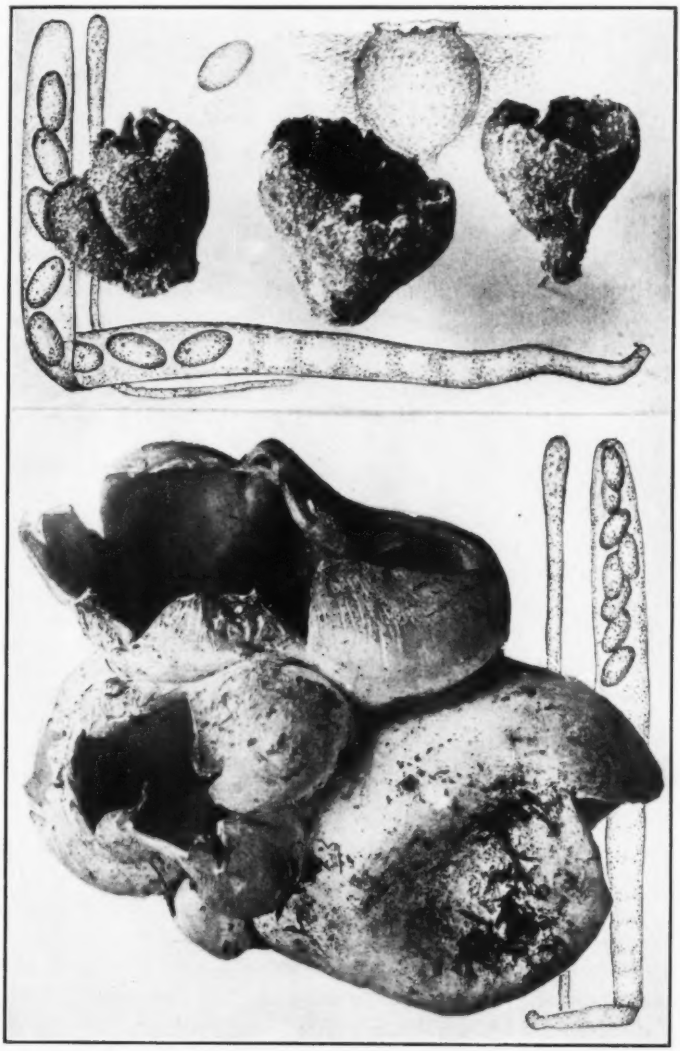
Lower figure. *Sepultaria arenicola.* Photograph of a cluster of apothecia

at various stages of development. Photograph by Mr. S. C. Edwards of Colton, California. Left, drawing of a portion of a hair of an apothecium. Right, tip of an ascus with spores.

PLATE 23

Upper figure. *Sarcosphaera funerata.* Photograph of three apothecia about natural size. Photograph by H. C. Beardslee of Perry, Ohio. Left, drawing of an ascus with spores and a portion of a paraphysis. Right, diagram of an apothecium showing habitat submerged in sand.

Lower figure. *Sarcosphaera coronaria.* Photograph of a cluster of apothecia made from material sent by S. H. Burnham from Washington County, New York. Right, drawing of an ascus with spores and a portion of a paraphysis.



SARCOSPHAERA FUNERATA
SARCOSPHAERA CORONARIA

A NEW CHANTERELLE IN CALIFORNIA

ELIZABETH EATON MORSE

(WITH PLATES 24 AND 25)

Cantharellus Bonarii sp. nov.

Pilei 3–7 cm. broad, fleshy, involute at first, regular in young plant, spreading and undulate at maturity, depressed at center; surface broken into thick, floccose more or less erect scales which fill the central depression. Scales orange colored at tips blending to lemon yellow at base, giving entire cap an orange-yellow color. Flesh white, firm, tapering in thickness to the margin.

Gills thick, very narrow, merulioid, decurrent, in some cases extending downward to half the length of the stipe, usually less, milk white in color, subdistant.

Stipe white, somewhat earth-stained, stout, solid, glabrous, 10–15 mm. in thickness, dilated upward into the pileus, mostly fused with other stipes from a common base, producing up to thirteen sporophores in one cluster—whole group 5–7 cm. tall.

Spores elliptic, hyaline, smooth, apiculate, 10–12 (14) × 5–6 microns.

Basidia 20–30 × 7–8 microns, 4-spored.

Odor none, not tested for taste.

Closely gregarious, partially hidden in deep humus under pine and fir. Type collected in two localities in General Grant National Park, California, September, 1927, by N. Nielsen and F. Mitchell.

The most striking feature of these collections is that the majority of the plants develop in gregarious clumps from fused bases, with occasional solitary specimens.

The surface of the pileus suggests very strongly *Cantharellus floccosus* Schw., but the depression in the pileus in our species is slight, while that in *C. floccosus* extends far into the base of the stipe; the stipe in the young plants consists of solid tissue throughout. The gills of our species are white and do not extend as far down toward the base as in *C. floccosus*. Spore measurements, however, do not differ much from those given by different

authors for *C. floccosus*. Specimens of this plant have not been found since the first season.

I wish to acknowledge the assistance of Doctor Lee Bonar in my study of this plant, also that of Doctor C. H. Kauffman for his review of this paper.

UNIVERSITY OF CALIFORNIA,
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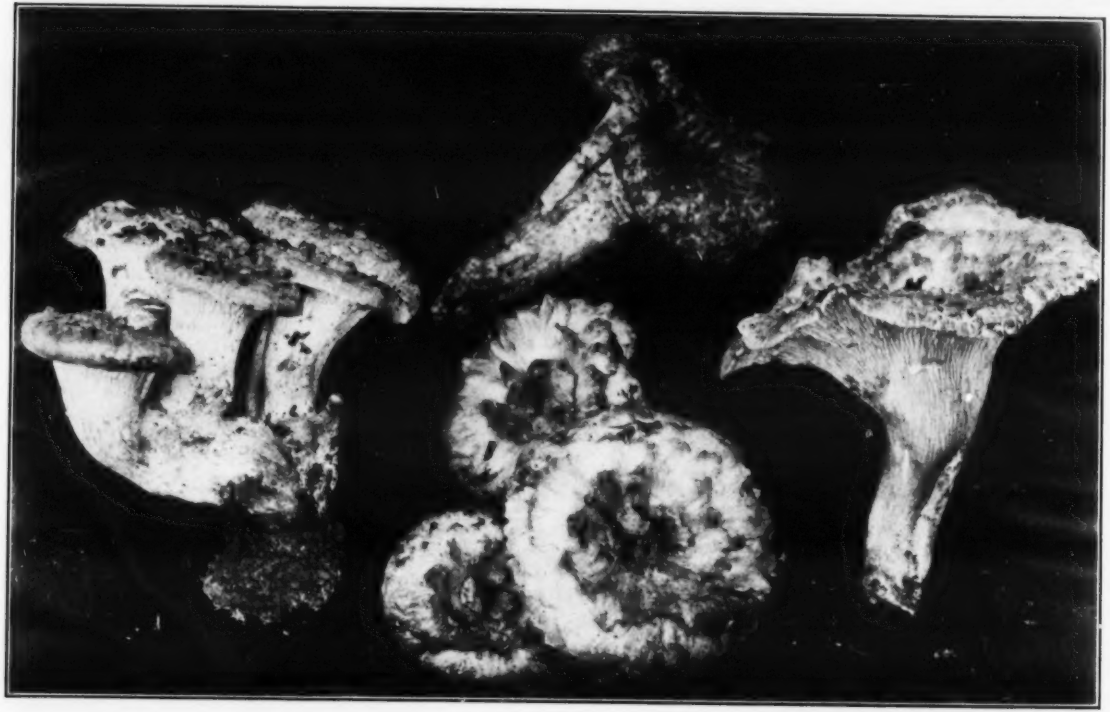
CANTHARELLUS BONARII



CANTHARELLUS BONARII

TRAMETES HISPIDA A DESTRUCTIVE PARASITE IN APPLE ORCHARDS

ERNEST C. SMITH

(WITH PLATE 26)

Trametes hispida Bagl., the American form of which has become familiar under the name of *Trametes Peckii* Kalchbrenner, has commonly been regarded as a saprophyte occurring only on the dead wood of willows and poplars. Observations extending over a period of six years have demonstrated that in Eastern Colorado this fungus is frequently found on apple trees and that on the new host it functions primarily as a parasite, the attacks in many cases proving fatal to the trees.

Murrill,[1] Overholts,[2] Saccardo [3] and Seymour [4] in their published works agree in restricting the occurrence of the American form to members of the Salicaceae; but in a letter Prof. Overholts calls attention to a collection from *Pyrus* at Bozeman, Montana, by Swingle in 1911 and to one by Long in the same year from the pepper-tree, *Schinus molle*, at Los Angeles. Saccardo [5] lists *T. hispida* as occurring on the dead wood of *Quercus*, *Fagus* and *Salix* in Italy and on the trunks of *Ceratonia* in Algeria, possibly implying a parasitic character on this last-named substratum.

In the writer's experience this fungus for some time was observed only as a saprophyte on stumps of cottonwoods at Greeley, Colorado. Later it was found in the mountains at moderate elevations, but still saprophytic on cottonwoods. Doubts as to the limitation of hosts and the exclusively saprophytic habit were roused at the same time by the discovery of well-developed pilei of this fungus on a living apricot tree. However, other fungi were present, the heart-wood of the tree was

[1] N. Am. Flora **9**: 79.
[2] The Polyporaceae of the Middle Western U. S. p. 69.
[3] Syll. Fung. **6**: 341.
[4] Host Index of the Fungi of N. Am. pp. 188, 190, 191, 192, 193, 194.
[5] Syll. Fung. **6**: 346.

decayed, and the parasitic character was suspected, rather than demonstrated.

The demonstration was provided later in connection with more extended observations at Fort Collins. The fungus was observed on a living and otherwise healthy cottonwood and watched from the first appearance of the sporophore to its maturity. The brackets were very numerous in an apple orchard about a mile south of Fort Collins, being most noticeable on dead and dying trunks. Investigations extending over a period of three years proved that these represented a final stage and that the initial appearance, easily overlooked, was on living twigs and young branches. As these died and were pruned away the mycelium made its way to the base of the branch and finally to the trunk, its progress from season to season being marked by the appearance of pilei farther down on the branch or trunk. The general indications were those of a typical heart-rot. Some forty trees had been killed, many were distinctly weakened and a considerable number showed the initial infection. No other significant fungi were found in the orchard. While the growth of the mycelium within, and of the pilei upon the dead trunks continued, there is no doubt that the fungus worked primarily as a parasite and only later as a saprophyte.

His attention once called to these facts, Dr. L. W. Durrell noticed and reported similar conditions in apple orchards near Canon City.

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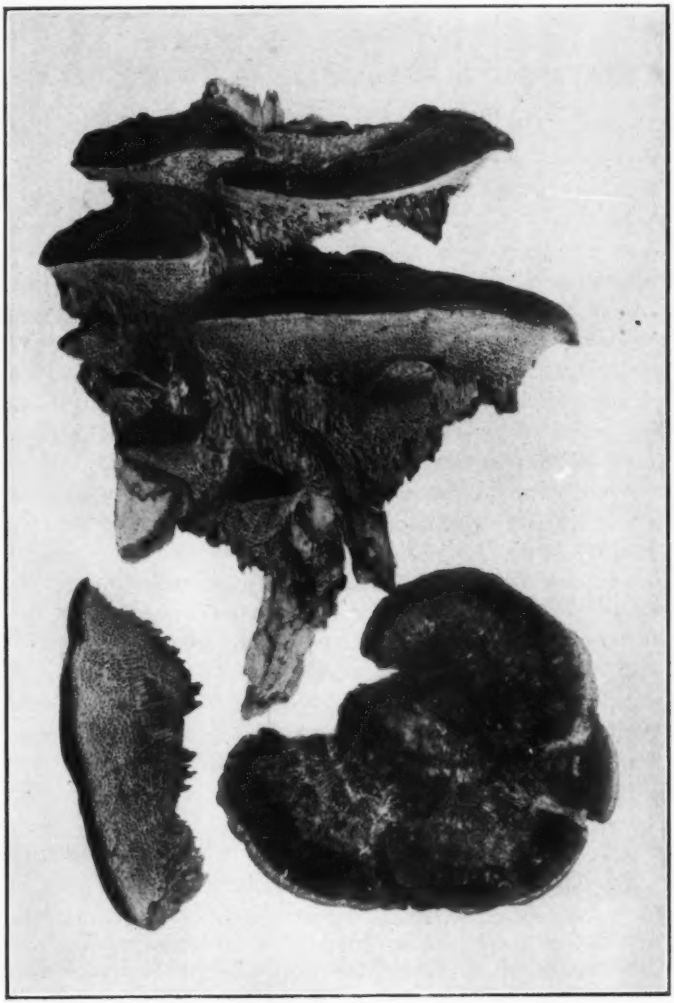
EXPLANATION OF PLATE 26

Pilei of *Trametes hispida* Bagl., showing position on trunk of living apple tree and lower and upper surfaces of other pilei from the same host.



TRAMETES HISPIDA

A NEW TRUFFLE IN BEDS OF CULTIVATED MUSHROOMS

W. W. Diehl and E. B. Lambert

(With Plate 27)

The occurrence of an unknown fungous pest in mushroom beds was first called to our attention in May, 1929, by a commercial mushroom grower at Ashtabula, Ohio. The complaint was made that it was "filling his beds and completely stopping the production of mushrooms." Specimens of soil and manure were submitted which contained ascocarps of an undescribed truffle. The infested mushroom houses at Ashtabula were visited early in June to obtain fresh material of the fungus and to make first-hand observations of its growth habits and the damage caused. Later, similar infestations were observed at Minneapolis, Minnesota, and in several mushroom houses in Chester County, Pennsylvania. Specimens which proved to be the same species have also been received from Rosendale, New York. Although its spores are smaller than those of any known truffle the structure of the fungus indicates its affinities to be among the Tuberales, apparently most closely related to *Pseudobalsamia*[1] Fischer or to *Balsamia* Vitt. Since it is quite different in certain respects from known species of these genera it seems proper to describe it as a new species.

Pseudobalsamia microspora sp. nov.

(Plate 27, figures *A–H*)

Ascocarps cream-colored to reddish brown, subspherical to discoid, irregularly lobed, 0.5–3.0 c. in diameter infolded at a distinct base when formed on the surface of the substratum; surface convolute to cerebriform; context fleshy, of interwoven hyphae generally thick walled, outer cells disintegrating to form an indefinite cortex or false rind, surface minutely scabrous,

[1] The writers are sincerely grateful to Dr. Helen M. Gilkey for pertinent criticism of the taxonomic viewpoint expressed here.

interior composed of closely crowded venae internae (spore bearing folds) separated by venae externae (labyrinthine canals) filled with a loose weft of anastamosing hyphae, canals converging at one or more points, usually having a common opening to the exterior, sometimes opening to the surface at more than one point; paraphyses reduced to anastamosing hyphae 5–7 μ in diameter; asci fugaceous, irregularly arranged throughout the venae internae, short or long stipitate, ovate to subspherical, (p. sp.) 18–25 $\times$ 12–15 μ with 8 spores or less, irregularly arranged, stipe variable, 3–10 μ broad and 6–15 μ long; spores subspherical, hyaline, sulphur-colored in mass, 5–7 μ, chiefly 6 μ in diameter, usually with one large colorless oil drop; epispore smooth, colorless, less than 1 μ thick; hyphae within the venae externae 8 μ to 12 μ in diameter; chlamydospores occasionally within hyphae of the ascocarp, spherical, 13 μ in diameter, content golden-brown with epispore 2 μ thick, smooth to finely granular.

HABITAT. Known only in mushroom beds; in the compost and on the surface of the soil.

GEOGRAPHIC DISTRIBUTION: Minnesota, New York, Pennsylvania, and Ohio, U. S. A.

SPECIMENS CITED: Ashtabula, Ohio, May 17, 1929, Dallas Luce; June 19, 1929, Dallas Luce and E. B. Lambert—Type; Minneapolis, Minn., July 14, 1929, E. B. Lambert; Rosendale, N. Y., Sept. 5, 1929, Hans Johanssen; Concordville, Pa., Sept. 25, 1929, F. J. Styer; Oct. 21, 1929, F. J. Styer and E. B. Lambert.

Specimens are deposited in the Mycological Collections, B. P. I., and certain duplicates in the Farlow Herbarium at Harvard University, the Herbarium of The New York Botanical Garden, and the Missouri Botanic Garden. Permanent slides deposited in Mycological Collections, B. P. I.

The fungus was isolated in Thaxter's potato agar by the tissue culture method and grown in pure culture upon neutral peat, and media made from different combinations of wheat, oats, rice, corn-meal, soil extract, and manure extract. Of these media, ascocarps developed best on boiled oats and soil extract (PLATE 27, FIG. *C*).

The ascocarps are variable in size, shape and color. They develop differently inside the bed than on the surface. Inside the bed they appear first as cottony wefts of mycelium from 1 mm. to 2 or 3 cm. in diameter. These wefts of mycelium

become more and more dense until they have assumed definite shape. In some cases several small ascocarps lying close to each other coalesce and form one larger ascocarp; they usually fill air pockets instead of expanding in tightly packed compost. On the surface of the beds there is often an extensive mycelial growth prior to ascocarp development, especially in a damp atmosphere. The mycelial growth over the surface of the bed may cover an area of a square meter about 1.5 cm. thick. From this loose weft the ascocarps develop as flattened, cerebriform, discoid structures with an opening on the ventral surface adjacent to the soil. Ascocarps may develop from a rudiment to a fully formed structure in four or five days.

The maturation of the ascocarps, *i.e.*, the formation of asci and ascospores, apparently is not dependent upon the size of the ascocarp. Under certain conditions asci and spores are formed when the ascocarp is 1 mm. or less in diameter; under other conditions the ascocarp may reach a diameter of 3 cm. before spores are formed. Preliminary observations of the growth in mushroom beds and in pure culture indicate that the size of mature ascocarp is dependent on numerous factors such as size of the air cavities in the compost, nutritional conditions, moisture content of the compost, and relative humidity of the atmosphere. The asci disintegrate with the desiccation of the ascocarp and the ripening of the spores, leaving an olivaceous sulphur-colored dusty mass of spores and hyphal fragments. Because of this powdery texture it is quite difficult to determine the structure of the ascocarp when mature without recourse to the sectioning of material that has been imbedded in paraffin.

The fungus apparently belongs in the Balsamiaceae but differs in many respects from the usual concept of any genus in that family. The irregular arrangement of the asci in the venae internae and the frequent convergence of venae externae into a common opening suggest a close relationship with *Pseudobalsamia*. It therefore seems expedient to place the species here until more conclusive evidence of other relationships is established. The fungus may be indicative of an undescribed genus but it seems preferable to include it in a broadened concept of *Pseudobalsamia*.

Little is known regarding the relation of the fungus to the

mushroom mycelium in the beds. During the early stages of the crop the yield of mushrooms in infested beds is usually normal. Under certain conditions, however, it is evident that the truffle materially reduces the yield during the latter half of the crop. Circumstantial evidence suggests that it enters the mushroom house in the compost and acts as a fungous weed rather than as a parasite in the mushroom bed. Further observation and experiment with pure cultures are necessary to clear up these points.

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EXPLANATION OF PLATE 27

Fig. *A*. Surface view of an infested mushroom bed, showing flattened cerebriform growth over the casing soil. (Ashtabula, Ohio, June, 1929.)

Fig. *B*. Interior of an infested mushroom bed, × ¼, showing numerous ascocarps. (Ashtabula, Ohio, June, 1929, Luce and Lambert.)

Fig. *C*. Ascocarps in pure culture on medium of oats and soil filtrate × 1.

Fig. *D*. Flattened ascocarps from soil surface, × 1. (Ashtabula, Ohio, June, 1929, Luce and Lambert.)

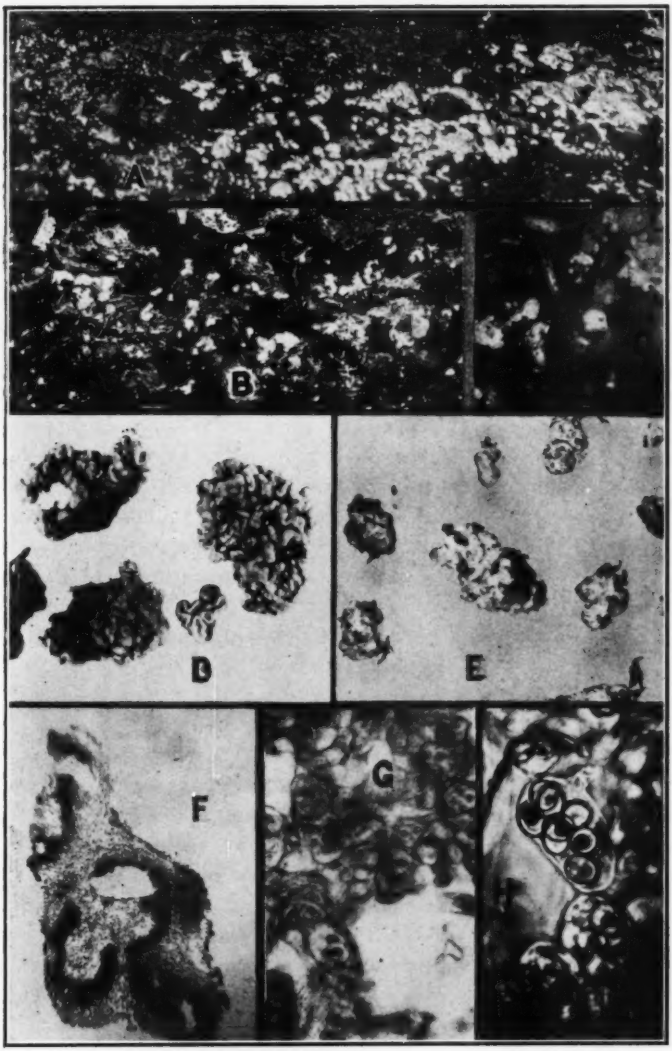
Fig. *E*. Ascocarps taken from the inside of a mushroom bed, showing their subspherical cerebriform shape. × 1. (Minneapolis, Minnesota, June, 1929, Lambert.)

Fig. *F*. Section through an ascocarp, × 11, showing the dense folded spore-bearing layers (venae internae) separated by sterile loose weft hyphae (venae externae). (Ashtabula, Ohio, May, 1929, Luce.)

Fig. *G*. Detail of venae internae of Fig. *F*, showing immature spores in closely crowded asci. × 500.

Fig. *H*. Mature asci showing irregularly arranged spores, × 950. (Concordville, Pa., Oct., 1929, Styer and Lambert.)

(Photomicrographs by J. F. Brewer)



PSEUDOBALSAMIA MICROSPORA

SOY-BEAN STOVER COMPOST FOR MUSHROOM CULTURE

ILLO HEIN

In the search for substitutes for the horse manure still almost exclusively used in commercial practice, further crude practical tests with composted soy-bean stover have given encouraging results although the yields were considerably below those obtained in the wheat straw compost and the checks which consisted of horse manure, handled in the conventional manner of composting. I have earlier reviewed the data (1930) in the literature concerning straw compost and given an account of tests made with it in mushroom culture. The yield of mushrooms from straw compost showed that it has possibilities in commercial practice but before it can be generally recommended to the growers data concerning the economical treatment of the straw and means for obtaining improved productivity will be necessary. Lambert (1929) has recently announced the production of mushrooms from straw compost, but also states that his results to date are unlikely to give much satisfaction to the commercial growers. Since the announcement of the straw compost studies I have found that the admixture of a small amount of horse manure with the straw gave a very satisfactory product and yields slightly better than those first reported (1930).

Well cured soy-bean stover was stacked in compost heaps and thoroughly watered. The first trials were conducted indoors in a cellar under the head house of the botany greenhouses during the winter months and four heaps were made. The latter were built up in stacks approximately 6 × 6, by 8 feet high to the ceiling. The comparatively high nitrogen content of the stover made it appear unnecessary to add further nitrogen compounds for the cellulose decomposing organisms yet in one stack horse manure was used.

Of the four compost heaps, lot number 1 was made entirely of the stover. Lot number 2 contained equal parts by volume of

wheat straw and soy-bean stover (the heap was built up with alternate 4-inch layers of each). In lot number 3, three parts by volume of straw was used to ⅔ stover and in lot number 4 about ⅓ part fresh horse manure was added.

The temperature rose slowly in the stover. In ten days the heaps attained a temperature around 80° F. In three weeks heap number 4 rose to 100° while the other three varied around 90° F. In four weeks a temperature of 120° was attained in heaps 2 and 3, while number 4 attained 130°.

At this time the lots, which had become reduced to about ½ the original volume, were broken down, forked over, watered, and made up into new heaps. The temperature had dropped to almost room temperature, 70°, in all the heaps and rose very slowly after the first week following the forking over. Two weeks later the temperature rose to around 110 degrees and then there was a gradual falling off until in eight weeks the piles cooled down to 100°. By this time there were considerable changes in the stover, the leaves were very soggy, and the smaller twigs and branches soft but the stouter sticks remained rather hard. In nine weeks the heavier sticks became softly brittle. The mass was by this time very black, had a sweet smell and began to look like a good compost. The stouter sticks, however, were still too hard to permit satisfactory forking over. Another turning was made after eleven weeks. In twelve weeks the stover was well broken down and a rich looking black compost which, while it was a bit soggy from excess watering, was on the whole a "good looking" product.

From the composted product 14 small beds were made up. Six were made up in the experimental mushroom house (Hein, 1929), 4 in the cellar under the head house of the botany greenhouses, and 4 in the old farm cistern converted for mushroom growing.

The beds were in all three places constructed in the conventional shelf type manner but they were not of standard size. The beds were arranged in three tiers, each about 3 feet wide and 30 inches high, running the length of the cellars. The plots were partitioned off at 18 inch intervals and made up about 7 inches in depth. In the experimental house the temperature was maintained around 75° F., in the cistern around 60° F. and under the

headhouse around 70° F. The temperatures fluctuated within 5° but were on the whole fairly constant. Beds were then made up and innoculated with spawn grown from spores on agar media in the laboratory.

The spawn in the beds containing the straw made the best run at the start and tended to be less "stringy" than in the beds containing no straw.

No correlation between the different temperatures in the three plants and either productivity or run of the mycelium was shown on either soy-bean compost beds, straw compost, horse or cow manure beds.

In no case was a satisfactory production of mushrooms from the soy-bean stover compost beds obtained but some mushrooms appeared on all the beds. Check beds produced well so that presumably the environmental conditions in the houses were not responsible for the low yields. Of the total area the average harvest per square foot was around 4 ounces. In some patches good clusters of normal sporophores appeared and here it was found that the physical condition of the compost was more like that found in good horse manure beds. I am of the opinion that the physical condition of the compost may have had more to do with the low productivity than the possible available nutritional substances in the compost.

The best method of handling the stover still needs to be determined by further experiment.

The mycelium grew very slowly at first and made a rather "stringy" growth from the beginning. The slow growth was possibly due largely to the excess of water contained in the compost. Excessively moist compost is, as I have earlier shown (1930), a possible factor concerned with the production of "stringy" mycelium. The soy-bean stover when thoroughly rotted dries very slowly and if once watered too heavily is difficult to restore to an optimum content.

The partial success of the first trials made further tests appear worth while. Since the presence of horse manure had no noticeable effect on mycelial growth no further tests were made with it at this time. The straw added somewhat to the improvement of the physical condition of the product and may eventually prove

to be useful in the mixture. Where the straw was used there was less tendency to soggy pockets and thus it aided in the making of a more uniform product.

Further compost tests were carried on outdoors in the spring and summer months. Heaps were made up with varying percentages of wheat straw and well cured soy-bean stover.

Eight heaps were made up this time and aside from the varying mixtures with straw and more attention to watering to avoid excess the lots were treated in about the same manner as were the preliminary ones.

Only ten beds were made up this time and all were prepared in the experimental house. Since the trials were conducted during the warmer months considerable difficulty was experienced in maintaining sufficiently low temperatures. The temperature repeatedly rose to 85° and even 95° F. In spite of this a fair run of mycelium was obtained in most of the beds and normal sporophores developed to maturity on four of them. On the other beds there appeared a few clusters of buttons of which some attained about a centimeter in diameter and then died off. The beds on which mushrooms grew to maturity were not noticeably different from those in which the mushrooms died off. Possibly temperature and moisture tends to be nearer the optimum in the more productive beds and this was not determined accurately.

The productivity of the beds if we exclude those in which the mushrooms died off prematurely was somewhat below that of the previous trails but undoubtedly the high temperatures were largely responsible for the reduced yields.

The tests, while they do not offer much encouragement to the commercial grower, indicate possibilities in this material and it is hoped that this announcement may lead others to make further tests since it will, even with the treatments given, produce mushrooms.

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MYCOLOGICAL NOTES FOR 1928-1929 [1]

L. O. Overholts

(With Plates 28–31)

1. Alternaria Dianthi Stevens & Hall.

Originally reported from North Carolina (Bot. Gaz. **47**: 409–413. 1909), this species finds little mention in the literature. This year (September, 1929) it was brought in by Dr. R. S. Kirby from a greenhouse in Reading, Pa., where it was causing extensive damage. The stems were usually cankered on the lower half and soon died. The whitened lesion bore abundant conidiophores, short, erect and in tufts, so that under a lens they appeared like *Colletotrichum* acervuli. My measurements of the spores (45–72 × 12–19 μ) are somewhat shorter than those given by Stevens and Hall. At any rate the spores are narrower than in most *Alternaria* species, and therefore, rather characteristic. They are rather strongly constricted at the septa, the middle cells often bulging considerably.

2. Ascochyta Catalpae F. Tassi.

A collection of leaves of *Catalpa* sent in from Newville, Cumberland County, Pa., on July 5, 1929, bore numerous spots typical of *Macrosporium Catalpae* Ellis & Mart. which was fruiting abundantly on some of the spots. Others were occupied by an *Ascochyta* which I take to be *A. Catalpae*, hitherto not reported from this country. Besides the small circular spots, large and irregular areas of the leaves were dead and on these the fungus was fruiting more abundantly. The following notes were made from this collection:

Pycnidia epiphyllous on small spots associated with *Macrosporium Catalpae* or on larger dead areas several centimeters in extent, not conspicuous, the spots grayish-brown with a

[1] Contribution from the Department of Botany, The Pennsylvania State College, No. 72. Publication authorized by the Director of the Pennsylvania Agricultural Experiment Station, as Technical Paper No. 507.

darker border; pycnidia depressed-globose, the wall brown rather than black as seen in sections, about 100 × 75 μ; conidiophores not seen, the pycnidia entirely filled with spores; spores elongate, hyaline, 2-celled, 11–13 × 3–4 μ.

On living leaves of *Catalpa*, associated with *Macrosporium Catalpae* (Overholts Herb. no. *11663*) (PLATE 29, FIG. 8).

It would appear that this fungus is not the primary cause of the spots, since they are typical of those formed by the *Macrosporium* which is fruiting abundantly on some of the smaller spots, but on many of the larger ones the *Ascochyta* occurs.

Dr. Dearness writes that this might be a 2-celled condition of the usual *Phyllosticta* on *Catalpa*.

3. CAMPTOUM CURVATUM (Kuntze) Link.

From a collection made near Clearfield, Pa., April 3, 1929, on dead *Carex* leaves, and identified by W. W. Diehl, the following diagnosis was drawn:

Fruiting stage appearing as small black cushion-shaped dots, 1/5 mm. diameter; in section showing no sterile base, hence not a sporodochium, but composed entirely of cylindric conidiophores 40–60 × 3–4.5 μ, which are hyaline except for the black and very prominent septa and the brownish, bulb-like cell at the base, the terminal cell narrow-conical and sporiferous, the sterigma extremely small and inconspicuous; spores produced in clusters on the terminal cell, very irregular in shape, ovoid to subglobose and always a considerable portion of them somewhat lunate, blackish-brown, smooth, 1-celled, 9–12 × 6–7.5 μ.

Macroscopically this fruiting structure looks like a sporodochium such as is produced by *Strumella* or *Epicoccum*. But in section, the absence of sterile stromatic tissue probably gives sufficient grounds for referring it to the Dematiaceae rather than to the Tuberculariaceae. Winter describes and illustrates this species in Rabenhorst, but gives spore measurements of 18–20 × 7–8 μ. In most other points his description is so applicable that an error in measurements might be postulated. I have had no authentic material for comparison (Overholts Herb. no. *11521*) (PLATE 29, FIGS. 9, 12).

4. HARKNESSIA CAUDATA Ellis & Ev.

Collected on small branches of fallen *Quercus* in Huntingdon Co., Pa., May 30, 1928. The species is well described in the

original article. It appears as small erumpent pustules on the bark, very inconspicuous until the spores are being discharged. Spores elliptic or fusoid, olivaceous-brown, 1-celled, 18–23 × 6–8 μ, with the base tailed with the conidiophore, the tip attenuate into a hyaline, narrow, straight or curved appendage, 15–20 μ long (Overholts Herb. no. *11030*) (PLATE 29, FIGS. 7, 11).

5. PHOMA OLERACEA *var.* ANTIRRHINI Sacc.

Specimens of *Antirrhinum majus* suffering from a serious canker disease on the lower parts of the stems, were sent in from Upper Darby, Pa., in November, 1929. Dr. H. W. Thurston and the writer investigated the fungus concerned and arrived at the conclusion that it is referable to the above species as described by *Saccardo*. Its relation to the cabbage fungus was not investigated. The following notes were made:

Pycnidia cortical and erumpent, black, numerous, in section compressed-globose or globose, with a definite wall, 100–125 μ diameter; conidiophores short and quite inconspicuous; conidia oblong or oblong-elliptic, not constricted, hyaline, 1-celled, 4–6 × 2–2.5 μ.

Forming conspicuous cankers on the stem near the ground line, these soon blackish in color (Overholts Herb. no. *11882*).

6. PHYLLOSTICTA BALDENSIS Massal.

This was collected at State College, on *Paeonia officinalis*, after the plants had been killed by frost in December. Spores minute, bacilliform, 3.5–5 × 0.75 μ. I have seen no previous report of this species from America. Dr. Dearness verified this reference of the fungus and sent me a piece of a leaf of *Paeonia* from Massalonga's collection and identification. *P. Commonsii* Ellis & Ev. would seem to be distinct in the very different spores, 4–8 × 2–2.5 μ (Overholts Herb. no. *11492*).

7. SCOLECOTRICHUM CLAVARIARUM (Desm.) Sacc.

On July 1, 1928, plants were collected of *Clavaria cristata*, showing a smoky black coloration at the base of the stem or involving almost the entire plant, giving in this case the semblance of the conidial stage of a *Xylaria*. When this was examined

microscopically the coloration was seen to be due to an imperfect fungus, apparently parasitic on the *Clavaria*, producing brown 2-celled conidia, 15–18 × 5–6 μ. These measurements are somewhat smaller than those given in Rabenhorst but there seems to be no doubt of the identity of the parasite which is said to be the conidial stage of *Rosellinia Clavariae* (Tul.) Winter (Overholts Herb. no. 11084).

8. CALICIOPSIS PINEA Peck.

Fitzpatrick (Mycologia **12**: 225. 1920) describes and discusses this and other species of *Caliciopsis* in his monograph of the genus. He reports it as occurring only on pines in this country. In Pennsylvania it is very common on the bark of small trees of living *Pinus Strobus*, sometimes associated with the small brown circular depressed cankers mentioned by Fitzpatrick and sometimes on a more conspicuous type of canker. The cankers of the latter type bear resemblance to the extreme roughening of the bark caused by the pine woolly aphis, occurring in most pronounced form just below the branch whorls. Small saplings heavily infested with this injury have been noted to die where at times, at least, no other agency responsible for their death could be found, so that I am inclined to agree with Fitzpatrick's guarded statement that the fungus is parasitic.

On May 30, 1928, this fungus was collected near Charter Oak, Huntingdon County, Pa., on a small dead sapling of *Tsuga canadensis*. This is the first report, apparently, of its occurrence on this host. Only a very limited amount of material was taken in this collection, but the fungus was in fine ascus fruiting condition.

9. HYPOCREA GELATINOSA (Tode) Fries.

Collected at Musser Gap, Center Co., Pa., Oct. 22, 1928, on dead limbs of *Carpinus caroliniana*. This is the first record of the species in my Pennsylvania collections. The two cells of the greenish to brown spores remain in contact until quite mature, separating eventually and then globose-oblong in shape, 5–6 × 4 μ. The description in Ellis and Everhart's Pyrenomycetes is quite applicable (Overholts Herb. no. *11437*).

10. MOLLISIA PINASTRI (Cooke & Peck) Sacc.

Originally described by Peck (Buf. Soc. Nat. Sci. Bull. **2**: 297. 1875) as *Peziza pinastri*, and again (Grevillea **7**: 40. 1878) as *Cenangium acuum* Cooke & Peck. Collected in quantity on dead needles of *Pinus Strobus* on small trees felled about a year previously, at Mont Alto, Franklin Co., Pa., May 31, 1929. Evidently entirely saprophytic. The small dark apothecia are less than 1 mm. diameter, and occur singly and scattered on the dead needles. Spores narrow fusoid, hyaline, 10–14 × 4 μ; paraphyses distinctly colored at the tip and 4–6 μ diameter (Overholts Herb. no. *11704*) (PLATE 31, FIG. 21).

11. OTTHIELLA STAPHYLINA (Ellis & Ev.) Dearn. & House.

Originally described as occurring on *Staphylea trifolia* and reported on that host by Dearness and House from Peck's collections (N. Y. State Mus. Bull. **266**: 71. 1925). Collected at State College, Pa., in 1928, on *Staphylea pinnata*. Dearness and House report the spores as hyaline and transfer the species from *Otthia* to *Otthiella* on that basis. The spores of my collection are recorded as faintly colored, and measure 10–15 × 4–6 μ. The gross features of the fruiting stage are shown in PLATE 31, FIG. 20 (Overholts Herb. no. *11436*).

12. RHYTISMA PUNCTATA (Pers.) Fries.

This species is common in the eastern United States. The usual hosts are *Acer pennsylvanicum* and *A. spicatum* and in central Pennsylvania it is rarely found on other hosts. Very occasionally it is present on *A. saccharum*. In the summer of 1924 it was collected on *Acer negundo* at Scott, Quebec, in considerable abundance. I have seen but one other previous record of it on this host (see Pl. Dis. Rept. Suppl. **37**: 370. 1925). *Acer negundo* is given in Seymour's Index as host for both this species and *R. acerina* (Overholts Herb. no. *12027*).

13. TAPESIA ROSAE (Pers.) Fuckel.

In clearing out dead wood from a large cultivated rose bush on the College Campus in July, 1928, a small *Cenangium*-like fungus was found on some old dead stalks. The apothecia were about 1 mm. diameter, sessile, grayish white and with a white fibrillose rim. One piece of the bark bore a distinct dark brown subiculum

from which the apothecia arose but most of the collection showed no subiculum at all under a hand lens. After failing to determine its identity with certainty, specimens were sent to Miss Edith K. Cash of the Washington Office of Mycology, who determined it as the above. A comparison of the descriptions of *Tapesia Rosae* and of *Mollisia cinerea*, shows little beside the brown subiculum to separate the two species, yet while I have been familiar with *M. cinerea* for years, I did not think of it in connection with this specimen. The following description was written from the specimens at hand:

Apothecia on the bark, probably not distinctly erumpent, sessile, gregarious, seated on a brown subiculum or subiculum definitely none, about 1 mm. diameter, the hymenium grayish-white, becoming slightly yellowish or bay on drying, the margin finely white-fibrillose, externally dark colored; in section showing a black exciple with a hyaline hypothecium of about equal thickness; asci 45–60 × 4–6 μ, 8-spored; spores biseriate, elongate, hyaline, 1-celled, 7–10 × 2–2.5 μ; paraphyses filiform, simple, about 2 μ diameter at the apex.

On the dead bark of dead rose stems (Overholts Herb. no. *11108*).

14. TYMPANIS ALNEA (Pers.) Fries.

Bursting through the bark in the form of small globular masses of apothecia, 5–20 apothecia per cluster, the clusters up to 4 × 2.5 mm., the apothecia about 0.5 mm. diameter, with a definite narrow stipe-like attenuation below, black without and within; asci clavate or subcylindric, about 150 × 15 μ, filled with countless allantoid, spermatoid or bacilliform spores, 3–3.5 × 1 μ; paraphyses filiform, about 2 μ diameter, not much branched and not much enlarged at the apex, the tips brownish and there agglutinated loosely to form a slight epithecium in which the individual paraphyses are yet discernible and from which they separate readily.

On dead standing *Alnus*. Stone Creek, Huntingdon Co., Pa. April 16, 1928 (Overholts Herb. no. *10960*) (PLATE 29, FIGS. 10, 13).

The plants described above differ from the descriptions available only in that the paraphyses are described as 6 μ diameter (hence much enlarged) at the apices. In my plants they are scarcely enlarged upwards. *T. conspersa* is also reported on *Alnus* and the description agrees about as well.

15. **Corticium effusum** sp. nov.

Rather widely effused for several centimeters, adnate, thin, sub-fleshy, "tilleul buff" or "pale pinkish buff" (Ridgway) on drying, not cracked, somewhat granulose, the margin thin, determinate; in section 200–250 μ thick, homogenous, the subhymenium rather compact of suberect hyphae only about 2 μ diameter between very numerous vesicular pyriform bodies 15–20 $\times$ 12–15 μ, thin walled; spores oblong or oblong-ellipsoid, smooth, hyaline, 4–5 $\times$ 2.5–3 μ; cystidia none; gloeocystidia rather numerous in the basidial layer, sub-cylindric, 24–40 $\times$ 6–8 μ, with a dense colored content, soon becoming very inconspicuous in KOH mounts and less rapidly so in lactic acid.

On wood of *Acer*. Type collected on ten year old *Acer* slash at Ferdinand, Vt., Oct. 1, 1926, by Dr. P. Spaulding (no. *43963*) (Overholts Herb. no. *11324*) (PLATE 28, FIG. 2).

The coloration of this species is quite similar to that of *Peniophora pubera*, but in other characters it has no similarity. It should be easily recognized by the multitude of small vesicular bodies in the subhymenium and the gloeocystidia in the hymenium. It would seem to fall near *C. vesiculosum* Burt, particularly in the somewhat similar coloration, the small diameter of the subhymenial hyphae, and the presence of vesicular bodies and gloeocystidia, the former, however, only 5–7 μ in diameter in that species. It differs further in not being at all stratose. The appearance of the vesicular bodies in sections is almost identical with that of *Stereum Murrayi* Berk. & Curt.

16. **Peniophora piceina** sp. nov.

Fructifications effused in small orbicular or irregular patches 1–4 cm. diameter, thin, adnate, the hymenium very pale drab or gray, "ivory yellow" or "pale olive buff" (Ridgway), more or less granular, becoming much cracked into very small four-sided areas but not revealing the underlying white subiculum, the margin determinate; in section 60–100 μ thick, homogenous, of very compactly interwoven hyphae; spores ellipsoid, smooth, hyaline 4–5 $\times$ 2.5–3 μ; cystidia quite inconspicuous except in very thin sections, confined to the basidial layer, broadly short clavate or ob-piriform with a small rounded bead at the apex, the whole 18–20 μ long, 6–8 μ diameter, scarcely projecting beyond the basidia, not incrusted, hyaline.

On bark of limbs of *Picea rubens*. Type collected at Cherry

Mt., N. H., July 7, 1926, by Dr. P. Spaulding (no. *43890*) (Overholts Herb. no. *11263*) (PLATE 28, FIG. 3).

I find no species of *Peniophora* described with the peculiar cystidia of this collection. Due to the fact that they do not project beyond the basidia, the small rounded bead at their apex might easily be mistaken for a globose spore on a basidium.

The general appearance of the species is similar to *P. albulum* Atk. & Burt. from which this differs in the substratum and the nature of the cystidia.

17. **Odontia coloradensis** n. sp.

Effused as a thin dull pinkish buff or drab crust that follows the irregularities of the substratum, cracked to the wood into small areas measuring 2 to 4 per mm., the margin thinning out, determinate; hymenium minutely papillate-hydnoid, the teeth terminating in minute, white, usually divided tips, visible only under a lens; in section 75–90 μ thick through the subiculum, composed of erect hyphae without any differentiation; spores ellipsoid, broadly ellipsoid, or oblong-ellipsoid, smooth, hyaline, 6.5–8.5 $\times$ 4–6 μ; cystidia as agglutinated clusters or cylinders of small hyphae, heavily incrusted, 15–30 μ diameter and projecting prominently from the tips of the teeth.

Type collected on dead witch-hazel (*Hamamelis virginiana*), in Bluebell Canon, Colo., elev. 6000 ft., March 9, 1928, by P. F. Shope (421) (Overholts Herb. no. *10995*) (PLATE 28, FIG. 5; PLATE 31, FIG. 19).

The distinguishing character of the species is the bundles of incrusted hyphae at the apices of the teeth. Under low power these first give the impression of the large septate incrusted cystidia so often found in species of this genus, but under higher magnification their structure is easily made out.

18. **Odontia corticioides** n. sp.

Effused in small patches, very inconspicuous and following the inequalities of the substratum, ivory yellow or cream-color, becoming minutely areolate on drying, the hymenial surface rough and uneven and without definite teeth; sections 150–200 μ thick, homogeneous, of sub-erect hyphae, hyaline, with very inconspicuous clamps and cross walls, 1.5–2.5 μ diameter; spores cylindric, mostly curved, hyaline, free and on basidia, 7–8 $\times$ 2–2.5 μ; in some sections there is considerable crystalline

material throughout the subhymenium; in others there is none; cystidia as narrow flexuous hyphae projecting in clusters from the tips of the very inconspicuous granules, these about 2 μ diameter, sometimes branched and in the subhymenium often traceable as inconspicuous agglutinated cylinders of hyphae.

On dead coniferous wood. Type collected in Estes Park, Colo., in 1926 by E. C Smith (no. *638*) (Overholts Herb. no. 10475); also by the same collector in the same locality, Feb. 12, 1928, and communicated by P. F. Shope (no. *451*) (Overholts Herb. no. 11003) (PLATE 28, FIG. 1, PLATE 29, FIG. 6).

I have searched thoroughly through the genus *Corticium* for this species but it seems not to have been described there. I refer it to *Odontia* rather than to *Grandinia* because of the cystidia at the tips of the elevations. The spores ally it with *O. stenospora*, in which, however there are well formed teeth, and cystidia more or less distributed over the hymenium.

In some sections the tufts of cystidial hairs extend downward into the subhymenial tissue as inconspicuous cylinders of agglutinated hyphae not clearly defined and giving the impression of imbedded cystidia or gloeocystidia.

19. **Phlebia cervina** n. sp.

Effused in small orbicular patches about 0.5 cm. diameter, and then irregularly confluent over small areas, separable from the substratum and the margin loosening slightly, fleshy-waxy in texture; hymenium "vinaceous-fawn" or "light vinaceous drab" (Ridgway) in color, with irregular domes or short rugae, never conspicuously radiately arranged and with no tendency to a poroid condition; in section 300–600 μ thick, the subhymenium consisting of a dense layer of erect hyphae producing the basidial layer and bearing some few incrusted conical or lance-shaped cystidia 5–7 μ diameter, not projecting strongly beyond the basidia and some of them entirely imbedded; below this a layer of more open and perhaps slightly gelatinous tissue bearing numerous clavate, ovoid, or broadly-ellipsoid gloeocystidia with a dense granular content and up to 15 μ diameter; substratal layer a broad zone of more horizontal hyphae; spores cylindric or slightly curved, smooth, hyaline, 5–6 $\times$ 2 μ.

On bark of limb of *Pinus ponderosa*. Type collected by W. H. Snell, at Ipswich, Mass., Jan. 31, 1929 (763) (Overholts Herb. no. *11484*) (PLATE 29, FIG. 14).

In the dried condition this fungus has about the color of *Corticium Overholtsii* Burt, but under a lens shows distinct granules, which on soaking up give the hymenium a typical *Phlebia*-like appearance. It cannot be referred to *Merulius* because of the nature of the hymenium, and no similar species has been described in that genus.

20. **Phlebia mellea** n. sp.

Sporophore resupinate, effused for several centimeters, fleshy-cartilaginous in texture, drying rather cartilaginous, the hymenial surface honey-colored or somewhat ochraceous cinnamon in dried plants, with numerous short radiating and anastomosing or branching conspicuous folds which remain rather distinct in the dried plants; margin rather thick, lacerate-fimbriate and paler (nearly white) in color in the fresh plants; in section 600–1500 μ thick, with substratal layer of loose hyphae sometimes agglutinated into rhizoid like strands, arising from a dense narrow dark zone only 40–60 μ diameter, which in turn gives place to a broad zone of interwoven non-gelatinized hyphae constituting the bulk of the sporophore and bearing the dense basidial layer between and over the folds of its outer surface; spores cylindric, smooth, hyaline, 7–9 $\times$ 3–4 μ; cystidia none.

On dead wood or bark of coniferous trees. Type collection collected on a dead Englemann spruce at Grand Mesa, Colo., alt. 10,000 ft., Sept. 12, 1929, by P. F. Shope and W. O. Jung (565) (Overholts Herb. no. *12080*). Also collected on dead coniferous wood in Arizona by W. H. Long, in 1916 (Overholts Herb. no. *12081*) (PLATE 31, FIGS. 18, 22, 23).

This is an unusually well-marked species in the conspicuous layering of the subhymenial region. The substratal layer of open hyphae resembles that of the tomentose layer of a *Stereum* and may, as in cases of resupinate stereums, indicate that the plant sometimes occurs pileate, though such is very doubtful.

21. CANTHARELLUS CINEREUS (Pers.) Fries.

Pileus 3–6 cm. diameter, more or less infundibuliform, the center perforate, the surface radiately rugose and appearing fibrillose-tomentose but practically glabrous under a lens, almost exactly duplicating the color of *Craterellus cornucopioides*, blackening somewhat on drying; margin even; context thin, concolorous; hymenium almost merulioid, but the main veins

radiating outward and connected by prominent cross veins and anastomoses, decurrent on the stem, cinereous; stem hollow, nearly equal, somewhat furrowed, concolorous above with the hymenium, paler below, 4–7 cm. long, 12–20 mm. thick; spores ovoid to ellipsoid, smooth, hyaline, 7.5–9 × 5.5–6 μ; cystidia none.

On the ground in coniferous woods (Overholts Herb. no. *11116*) (PLATE 30, FIG. 17).

From the upper surface view this would be thought to be *Craterellus cornucopioides*. As a matter of fact these plants were gathered by Mrs. Overholts along with plants of that species that had been pointed out as desirable to have, and the inclusion of the *Cantharellus* was not noticed until the plants were the next day examined in the laboratory. That it is not a merulioid form of *Craterellus cornucopioides* is evident from a comparison of the spores of the two species. Murrill has referred it as a synonym for *Cantharellus infundibuliformis*, and while the spores are about the same, the hymenial configuration and the entire absence of any yellowish tints to the stem are sufficient to separate it. Ricken holds it distinct, although his illustration does not do justice to the hymenial configuration of my plants. Kauffman does not list the species.

22. NYCTALIS PARASITICA (Bull.) Fries.

Collected Aug. 14, 1929, in Cook Forest, Jefferson Co., Pa., on an old decaying *Russula*, probably *R. nigricans*. Four small specimens of the parasite were fruiting on one plant of the *Russula*. The species differs from the more common *N. asterophora* in the very different spores that are of different shape, lack the spiny wall characteristic of that species, and have the body of the spore surrounded by the unaltered hyphal wall in the form of a sheath. Seymour's host index records this species as occurring on *Russula foetens*. The host for my plants was certainly not that species but one that becomes very black as it decays. Murrill lists only *N. asterophora* Fries as occurring in this country. The following notes were made from the collection:

Pileus 5–15 mm. broad, convex, gray or grayish brown, finely-floccose but not conspicuously powdery, dry; margin deflexed; flesh extremely thin, black where bruised; gills adnate, distant,

thick, smoky-gray; stem central, equal, white, blackish where bruised, finely silky-fibrillose, subshining, 1.5–2 cm. long, 1–2 mm. thick; basidiospores not found; chlamydospores numerous, ochraceous-brown, ellipsoid, thin-walled, smooth, 14–16 × 8–9 μ, surrounded by a conspicuous hyaline, hyphal sheath and measuring over all 24–30 × 8–10 μ.

On old decaying *Russula*, probably *R. nigricans* (Overholts Herb. no. *11736*) (PLATE 30, FIG. 16).

23. STROPHARIA RUGOSO-ANNULATA Farlow.

Pileus 4.5–8 cm. broad, at first nearly hemispheric, then convex to plane, inclined at times to be unsymmetrical, the unexpanded buttons "dark vinaceous drab" in color, older specimens "benzo-brown" to "fawn color" (Ridgway) usually rather uniformly colored but sometimes slightly lighter in color in the center or in irregular rays on the margin, slightly viscid, slightly and minutely floccose-scaly except at the disk, soon glabrous except on the margin which retains fibrillose traces of the veil; context fleshy, white, 6 mm. or less thick over the stem, thinning out to a few millimeters on the margin, taste and odor not characteristic; gills sinuate-adnate to adnexed, close or somewhat crowded, 4–6 mm. broad, at first "pale gull gray," soon darker and finally "purplish gray" with a whitish edge that becomes more pronounced as the sides of the gills become darker from the maturing spores; stem central, equal or somewhat enlarged at base, glabrous, creamy white becoming yellowed where handled and on drying, stuffed, 7.5–13 cm. long, 0.8–1.5 cm. thick at apex, 1.5–3 cm. thick at base; veil ample, rather thick, creamy white or yellowish, usually leaving a well-formed annulus with unsymmetrical radiating lobes, superior, striate on the upper surface, or occasionally evanescent, leaving only a spore-stained trace on the stem; spores ovoid or ovoid-elliptic, with a minute hyaline papilla usually visible at one end, dark yellow-brown, smooth, 13–15 × 8–9 μ; cystidia present as rather numerous inconspicuous, usually pointed bodies, not projecting strongly beyond the basidia, hyaline, 9–12 μ diameter.

Growing gregariously in the woody debris along the banks of streams. Collected on Penn's Creek, near Ingleby, Center Co., Pa., July 4, 1929, by H. A. Wahl, and at the same station July 13, 1929, by C. S. Parker and H. A. Wahl (Overholts Herb. no. *11692*). Collected repeatedly in the vicinity of Washington, D. C., in the fall of 1929 and June, 1930, by C. S. Parker. (PLATE 30, FIG. 15.)

As in *S. bilamellata* and *S. coronilla* the annulus, when well developed, is distinctly striate on the upper side.

Mr. H. A. Wahl reports the species as edible and surpassed in flavor by no other.

In Peck's herbarium at Albany there are two collections of what is apparently this species, one by G. E. Morris at Waban, Mass., 1905, and another by G. B. Fessenden, also from Massachusetts in the same year. The spores of these are a trifle smaller than in my collection, mostly 10–13 μ in length, but an occasional spore is 15 μ long. The cystidia are the same as in my specimens.

NOTE: The above account of this species was compiled during the summer of 1929, and included in this manuscript as a new species under a different name. At that time I had not seen the newly issued Icones Farlowiana, and it was not until this manuscript was in galley proof that the priority of Farlow's name was noted. Whereupon, the name assigned to this species in my manuscript was withdrawn but the description allowed to stand as above. I have now eight collections of this species in my herbarium.

24. POLYPORUS ADMIRABILIS Peck.

This handsome white polypore has been very seldom collected outside of New England and New York, where its favorite host is the apple tree, though occasionally found on such other hosts as *Acer* and *Juglans*. A fine large specimen was collected at the base of a large living *Quercus* on the Boal Estate near Boalsburg, Center Co., Pa., June 30, 1929. The habit of this plant was much that of *P. Berkeleyi*, with a tubercular central stem rather than the slender terete stem more typical of smaller specimens. The hymenium becomes blackish where handled—a character not mentioned in the descriptions. The spores (7–9 $\times$ 2.5–3.5 μ) are different from those of species of similar habit. This plant was 30 cm. in diameter, though somewhat larger sizes have been collected. *P. albiceps* Peck is scarcely more than a small form of this species, and *P. Underwoodii* is not distinct (Overholts Herb. no. *11643*).

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EXPLANATION OF PLATES

PLATE 28

Fig. 1. *Odontia corticioides.* Vertical section through the hymenial and subhymenial region of a single very convex papilla, showing spores and protruding cystidia. × 500; spores × 660. From type collection.

Fig. 2. *Corticium effusum.* Vertical section through the hymenium and about two-thirds of the underlying subiculum, showing the many ovoid imbedded vesiculose cells and two gloeocystidia reaching the surface of the hymenium. × 625. From type collection.

Fig. 3. *Peniophora piceina.* Vertical section through sporophore showing homogenous subhymenial tissue, three cystidia in the hymenial layer, and spores. × 590. From type collection.

Fig. 4. *Stropharia rugoso-annulata.* Basidial layer, showing cystidia and spores. × 510. (Overholts Herb. no. *11692.*)

Fig. 5. *Odontia coloradensis.* Vertical section through a single papilla, showing homogenous nature of the subhymenial region and two bundles of incrusted hyphae protruding at the apex. × 585. From type collection.

PLATE 29

Fig. 6. *Odontia corticioides.* Vertical section through the sporophore, showing the homogenous structure of the subhymenium and the clusters of hair-like cystidia protruding at the apex of each obtuse papilla. × 100. From type collection.

Fig. 7. *Harknessia caudata.* Vertical section of pycnidium. × 72. (Overholts Herb. no. *11030.*)

Fig. 8. *Ascochyta Catalpae.* Vertical section through pycnidium. × 365. (Overholts Herb. no. *11663.*)

Fig. 9. *Camptoum curvatum.* Conidia. × 710. (Overholts Herb. no. *11521.*)

Fig. 10. *Tympanis Alnea.* Habit sketch to show cluster of apothecia bursting through the cortex. × 7. (Overholts Herb. no. *10960.*)

Fig. 11. *Harknessia caudata.* Spores and appendages. × 470. (Overholts Herb. no. *11030.*)

Fig. 12. *Camptoum curvatum.* Conidiophores showing conidial scars at apex. × 675. (Overholts Herb. no. *11521.*)

Fig. 13. *Tympanis Alnea.* Ascus with bacilliform spores; also a single paraphysis. × 513. (Overholts Herb. no. *10960.*)

Fig. 14. *Phlebia cervina.* Vertical section through sporophore, showing the hymenial region with incrusted cystidia, the upper subhymenial region with enlarged gloeocystidia, and the substratal region of homogenous hyphae. × 354. From type collection.

PLATE 30

Fig. 15. *Stropharia rugoso-annulata.* Photo of smaller specimens from Overholts Herb. no. 11692 collection. × 1. Photo by C. S. Parker.

Fig. 16. *Nyctalis parasitica.* Showing three sporophores of the parasite on the pileus of an old decaying *Russula.* × ¾. Photo by C. S. Parker. (Overholts Herb. no. *11736.*)

Fig. 17. *Cantharellus cinereus.* Photo showing view of hymenium and stem. × 1. (Overholts Herb. no. *11116.*)

PLATE 31

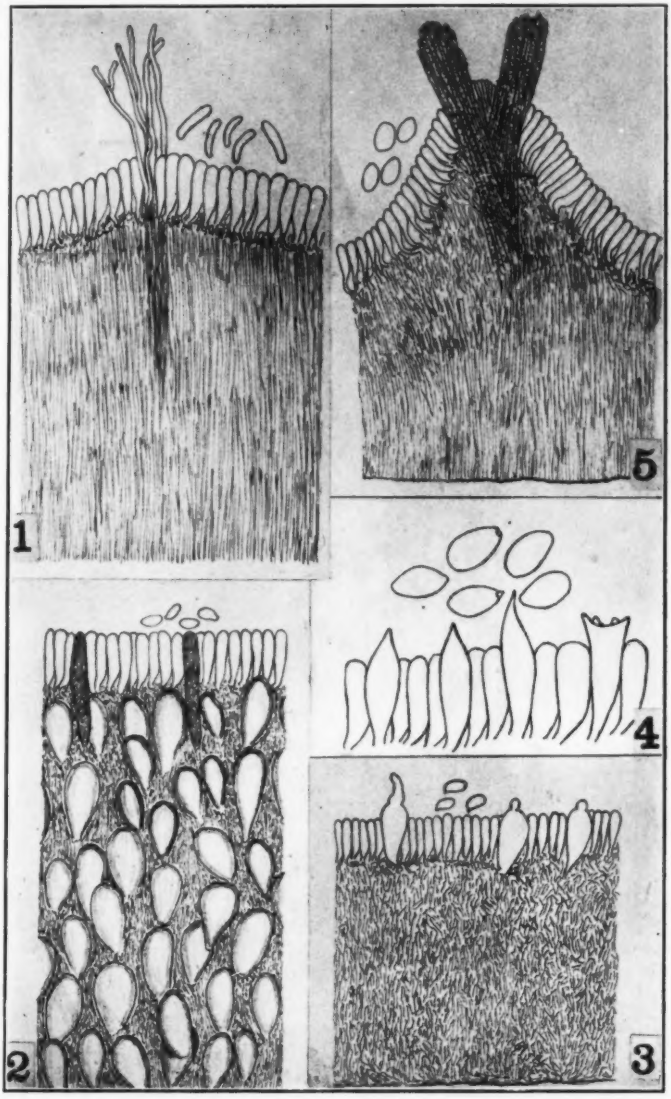
Fig. 18. *Phlebia mellea.* Vertical section through sporophore showing the very evident layering. × 84. (Overholts Herb. no. *12081.*)

Fig. 19. *Odontia coloradense.* Vertical section through sporophore, showing the columnar fascicles of hyphae protruding at the apices of the teeth. × 150. From type collection.

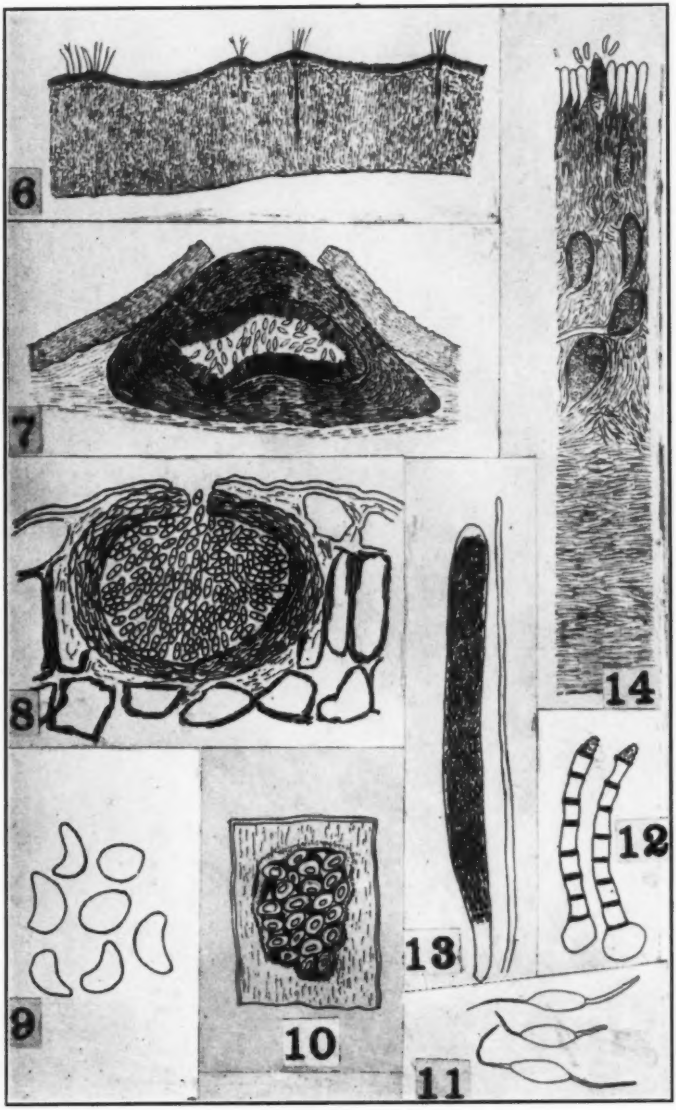
Fig. 20. *Otthiella staphylina.* Vertical section through stroma, showing arrangement of perithecia. × 107. (Overholts Herb. no. *11436.*)

Fig. 21. *Mollisia pinastri.* Vertical section through apothecium on pine needle. × 120. (Overholts Herb. no. *11704.*)

Figs. 22, 23. *Phlebia mellea.* Photo of hymenial surface of type specimen. × 1. Photo by P. F. Shope.



PENNSYLVANIA FUNGI



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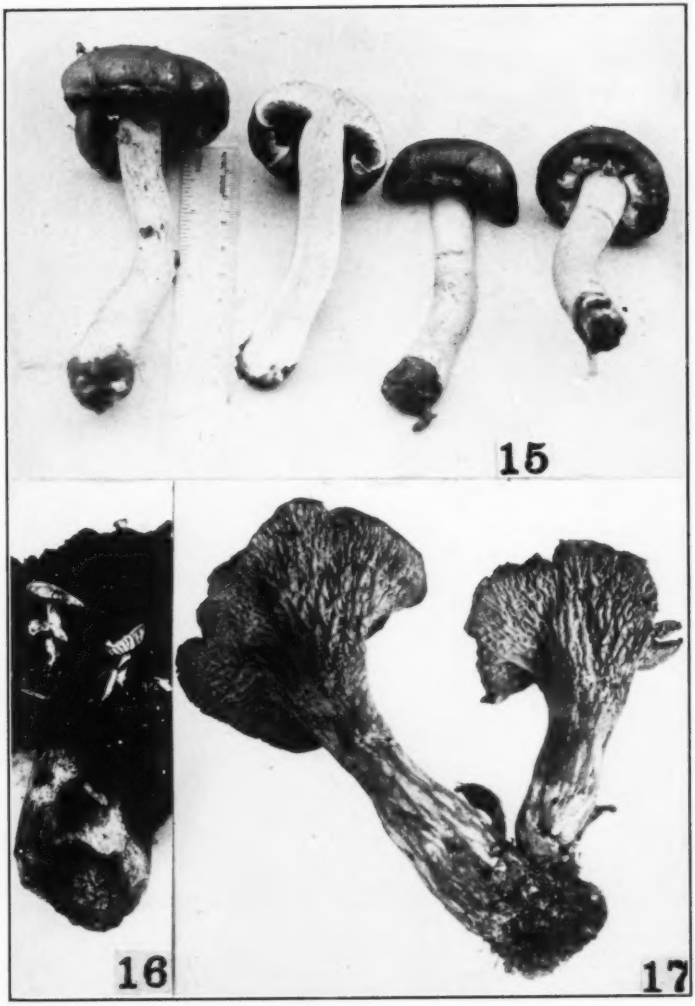

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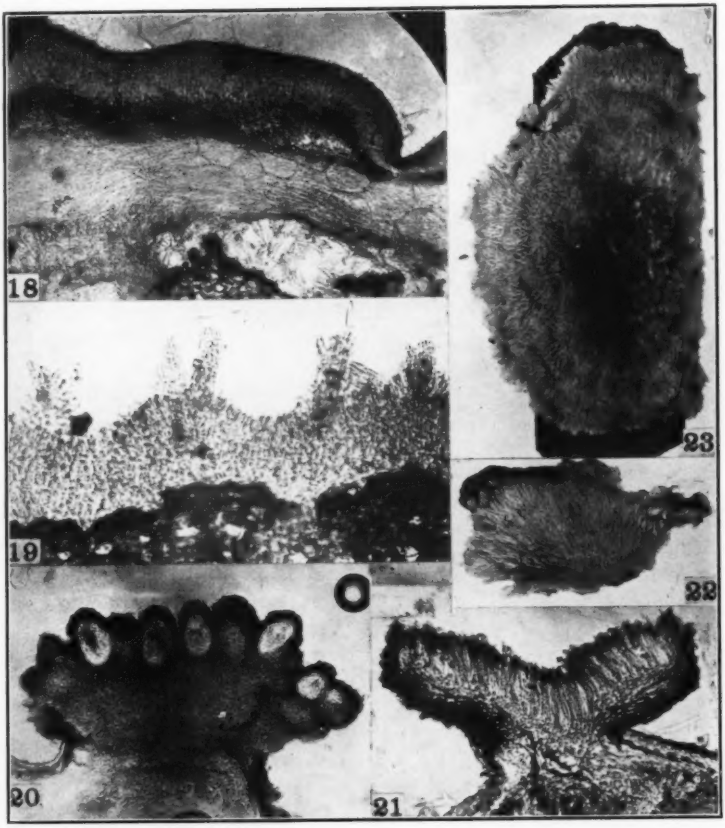

PENNSYLVANIA FUNGI

NEW SPECIES OF LICHENS FROM PORTO RICO—IV [1]

JOYCE HEDRICK

As planned by the author of the first paper [2] of this series, the second and third papers have been published by Doctor E. A. Vainio and Doctor A. Zahlbruckner respectively. It is the writer's privilege to present this miscellaneous group of new species by various authors as the fourth paper.

The types are deposited in the Herbarium of the University of Michigan, as are also the types of the species listed in the first paper of this series, and cotypes of those in the second and third papers.

1. **Porina Vainii** Fink, n. sp.

Thallus indistinct, immersed in the substratum, and showing at the surface as a greenish gray to whitish coloration; perithecia small to middle-sized, 0.6–0.8 mm. across, semisuperficial and scattered, the superficial portion subhemispherical and black, the perithecial wall globose and complete, the ostiole minute and indistinct; hymenium hyaline; paraphyses hyaline, distinct to semidistinct, unbranched or rarely branched toward the apices; asci cylindric to narrowly clavate; spores 8, hyaline, ovoid-oblong to fusiform, 1-septate, the cells cylindric, 10–14 × 4.5–5.5 μ, uniseriately arranged.

The algal host is *Trentepohlia*.

On rocks on an exposed hilltop near Yauco, Fink *1431* (type). Also on limestone near Trujillo Alta, Britton *8659*, *8662*, *8664*, collected in 1926.

2. **Pseudopyrenula confluens** G. K. Merrill, n. sp.

Thallus thin, smooth, ashy, more or less bordered and dissected by black lines; perithecia small to middle-sized, 0.4–0.8 mm. across, black, slightly immersed in the substratum to superficial,

[1] Papers from the Herbarium of the University of Michigan, No. 15.

[2] Number III of this series was published by A. Zahlbruckner, Mycologia, **22**: 69–79. 1930.

the superficial portion spheroidal and often slightly flat or subconical, the perithecial wall dimidiate, the ostiole inconspicuous; hypothecium often tinged with brown; hymenium hyaline; paraphyses hyaline, branched and interwoven; asci clavate, the wall moderately thickened in the apical region; spores 8, hyaline, oblong-elliptic, 3-septate, the cells lenticular, 16–18 × 5–5.5 μ, irregularly arranged.

The algal host is *Trentepohlia*.

On bark in a wood near Aibonito, Fink *1856* (type). Also near Maricao, Britton and Cowell *4289*, collected in 1915.

3. **Pseudopyrenula portoricensis** Hedrick, n. sp.

Thallus very thin, greenish gray to whitish about the perithecia, somewhat shining; perithecia minute, 0.15–0.24 mm. across, wholly or largely immersed in the substratum and the thallus, often clustered, little more than the minute and indistinct, blackish ostiole showing, the perithecial wall thin and complete; hymenium hyaline; paraphyses hyaline, distinct, branched and interwoven; asci broadly clavate, the wall scarcely thickened in the apical region; spores 8, hyaline, oblong, 3-septate, the cells lenticular, 16–21 × 7–8 μ, irregularly arranged.

The algal host is *Trentepohlia*.

On bark in a wood near Mayaguez, Fink *1025* (type). Collected near Santurce, Mr. and Mrs. A. A Heller *1287*, in 1899 and E. G. Britton *1474*, in 1914; near San Juan, Britton and Wheeler *298*, in 1906; near Bahia Puerco, Britton and Britton *8838b*, in 1927.

4. **Mycoporellum deserticola** Fink, n. sp.

Thallus thin, smooth, light greenish gray to ashy; perithecia small to middle-sized, 0.3–1 mm. across, adnate, black, flat to slightly convex, circular in outline to slightly irregular, the chambers 10–20, each indicated by a very minute, papilliform elevation, the perithecial wall dimidiate; hymenium and hypothecium hyaline or the latter tinged with brown; paraphyses hyaline, few and soon breaking down; asci subpyriform, the wall much thickened in the apical region; spores 8, hyaline to brownish, elliptic-soleaeform, 1–3-septate, the cells cylindric, 21–25 × 6.5–8 μ, irregularly arranged.

The algal host is *Palmella*.

On shrubs on exposed hilltop near Yauco, Fink *1688* (type). On *Coccolobis*, Guayanilla, Dr. and Mrs. N. L. Britton *7192*, collected in 1923.

5. **Arthonia minutula** Fink, n. sp.

Thallus very thin, smooth, more or less continuous, ashy white; apothecia very minute, 0.05–0.08 mm. across, immersed to adnate, round to irregular, the disk concave to flat, brownish black to black; hypothecium and hymenium hyaline; paraphyses hyaline, indistinctly branched and interwoven; asci subglobose, the wall slightly thickened in the apical region; spores 8, hyaline, elliptic to long-elliptic, 7–9-septate, the cells cylindric, 45–54 × 15–21 μ, irregularly arranged.

The algal host is *Trentpohlia*.

On trees, Isabel Segunda to Cerra Encanta, Vieques Island, J. A. Shafer *2564*, collected in 1914.

6. **Gymnographoidea suborbicularis** Fink, n. gen. and n. sp.

Thallus thin, smooth to somewhat rough, becoming chinky and minutely areolate, continuous and widespread, greenish gray to ashy; apothecia minute, 0.1–0.25 mm. across, immersed to partly superficial, round, the disk concave to flat, black, the exciple appearing thin and brown in section; hypothecium and hymenium hyaline; paraphyses hyaline, slender, unbranched or furcately branched toward the apices; asci clavate; spores 8, hyaline, elliptic-dactyloid, 3-septate, the cells cylindric, the second cell from one end larger, 15–18 × 4–5.5 μ, biseriately to irregularly arranged.

The algal host is *Trentepohlia*.

Gymnographoidea differing from *Arthonia* by the definite round apothecia and the thin brown proper exciple.

On bark in a wood near Rio Piedras, Fink *2194*.

7. **Leucogymnospora intricata** Fink, n. gen. and n. sp.

Thallus very thin to thin, smooth, closely adnate to the substratum, olive green to ashy gray; apothecia short to longer but very narrow, 0.6–2.5 × 0.12 mm., immersed, curved to flexuous and sometimes branched, irregularly clustered, the disk appearing as a narrow black line, closed to rarely opened, the exciple thin to thick, colored like the thallus; hypothecium and hymenium hyaline; paraphyses hyaline, unbranched, slender, several-septate; asci clavate; spores 8, hyaline, elliptic to oblong-elliptic, with a heavy wall, 3-septate, the cells rectangular, 20–23 × 7.5–8.5 μ, irregularly arranged.

The algal host is *Trentepohlia*.

Leucogymnospora differing from the genera of the *Graphidaceae*

by the immersed apothecium without a proper exciple, and by the unbranched paraphyses and the hyaline spores with rectangular cells.

On bark in a wood near Rio Piedras, Fink *2193*.

8. **Melaspilea elutericola** Fink, n. sp.

Thallus imbedded in that of the host and invisible; apothecia oblong, straight, small and narrow, 0.5–0.7 × 0.04–0.06 mm., adnate, unbranched, usually conglomerate in flat black areas, usually many in a group, the groups 0.5–3.5 mm. across, round to irregular, the disk rarely seen as a black, depressed line or slightly open, but the individual apothecia more often scarcely discernible in the groups; hypothecium and exciple dark brown in section and of moderate thickness; hymenium hyaline below and brownish above; paraphyses rather slender, hyaline below with brownish apices, unbranched and becoming indistinct, especially below; asci clavate, the wall considerably thickened in the apical region; spores 8, brown, 1-septate, slightly constricted, the upper cell slightly larger, 15–17 × 7.5–8.5 μ, irregularly arranged.

The algal host is *Trentepohlia*.

On *Trypethelium eluteriae* Spreng. near Montalva, Britton, Cowell and Brown *4837*, collected in 1915.

9. **Micrographina palmicola** Fink, n. gen. and n. sp.

Thallus composed of hyphae imbedded in the algal host and appearing as small, round or irregular, radiately branched, ashy gray areas; apothecia minute, 0.2–0.3 mm. across, adnate, the disk flat to slightly convex, black, the exciple thin, colored like the thallus; hypothecium and hymenium hyaline; paraphyses hyaline, moderately thick, unbranched or rarely branched toward the apices; asci short clavate, the wall little thickened in the apical region; spores 8, hyaline, dactyloid, 3-septate, the cells cylindric, the second cell from one end wider, 17–23 × 4.5–5 μ, irregularly arranged.

The algal host is *Phyllactidium*.

Micrographina differing from *Melaspilea* in the superficial position with reference to the substratum, the hyphae imbedded in the algal host above the tissues of the leaf.

On leaves in a wood near Rio Piedras, Fink *484a* and *502* (type).

10. **Psorotichia heterocarpa** G. K. Merrill, n. sp.

Thallus thin, blackish, scattered, granulose; apothecia minute to small, 0.1–0.3 mm. across, adnate, very numerous, scattered or crowded, hemispherical to conical and irregular, the exciple blackish, nearly closed or receding slightly and showing a dark, slightly concave disk; hypothecium pale yellowish brown; hymenium hyaline; paraphyses hyaline, coherent, indistinct; asci clavate; spores 8, hyaline, oblong-elliptic, non-septate, 14–20 × 8.5–10 μ, irregularly arranged.

The algal host is *Xanthocapsoid.*

On rocks on an open hillside near Yauco, Fink *1629.*

11. **Psorotichia Vainii** Fink, n. sp.

Thallus thin, often scattered, dusky grayish; apothecia minute, 0.1–0.2 mm. across, adnate, the exciple reddish and darkening, covering the disk or receding slightly and showing an impressed, reddish disk; hypothecium and hymenium hyaline; paraphyses hyaline, coherent, distinct; asci clavate; spores 8, hyaline, oblong-elliptic, non-septate, 13–20 × 5–8 μ, uniseriately to irregularly arranged.

The algal host is *Xanthocapsoid.*

On rocks on a dry hilltop near Yauco, Fink *1525.*

12. **Biatorina leucoblephariodes** G. K. Merrill, n. sp.

Thallus very thin, smooth, ashy gray, in small to middle-sized, irregular, more or less scattered areas; apothecia minute to small, 0.15–0.4 mm. across, adnate, frequently irregular, the disk flat, black, the exciple thin, entire, black, often surrounded by a soon disappearing thalloid layer; hypothecium becoming dark brown; hymenium hyaline; paraphyses hyaline, coherent, semidistinct; asci clavate; spores 8, hyaline, oblong-elliptic, 1—rarely 2- or 3-septate, 7–9.5 × 1.8–3 μ, irregularly arranged.

The algal host is *Protococcoid.*

On leaves of grapefruit in an orchard near Manati, Fink *2127.*

13. **Bilimbia Stevensonii** Fink, n. sp.

Thallus thin, minutely granulose or appearing minutely powdery, continuous or scattered into small, irregular areas, bright sulphur-yellow; apothecia very minute, 0.08–0.2 mm. across, adnate to almost sessile, round to somewhat irregular, often clustered, the disk flat to slightly convex, bright yellow, the exciple covered with minute, thalloid granules; hypothecium and

hymenium hyaline; paraphyses hyaline, unbranched, free, usually short and often indistinct; asci broadly clavate and becoming enlarged toward the apices, or ventricose at maturity of the spores; spores 8, hyaline, elliptic to finger-shaped, 3-septate, more or less constricted at the middle septum, the middle cells usually larger, 13–16 × 3.5–4 μ, irregularly arranged.

The algal host is *Protococcoid*.

On bark near Rio Piedras, J. A. Stevenson *5163* (type), collected in 1916 and Fink *87*.

This peculiar thalloid appearance has been found elsewhere but always without the apothecia.

14. **Catillaria epiphylla** Fink, n. sp.

Thallus thin, smooth to minutely granulose, continuous or scattered in small irregular areas, yellowish gray to ashy; apothecia minute, 0.08–0.2 mm. across, adnate, round to somewhat irregular, the disk flat to convex, flesh-colored or rarely whitish pruinose, the exciple thin, colored like the disk, soon disappearing; hypothecium and hymenium hyaline; paraphyses hyaline, slender, unbranched or branched toward the apices; asci clavate, the wall somewhat thickened in the apical region; spores 8, hyaline, elliptic, pointed at one end and somewhat obtuse at the other, 1-septate, the cell toward the obtuse end larger, 12–16 × 4–5 μ, irregularly arranged.

The algal host is *Protococcoid*.

On leaves near Mayaguez, F. L. Stevens *1101a*, collected in 1913.

15. **Catillaria Zahlbruckneri** Fink, n. sp.

Thallus thin to moderately thick, ashy, sometimes tinged light brown, scurfy-granular to chinky-areolate, the areoles sometimes scattered, smooth, becoming rough, frequently showing a black hypothallus; apothecia minute to small, 0.2–0.6 mm. across, adnate, often clustered, the disk convex to irregular, the surface becoming rough, black, the exciple black, soon disappearing; hypothecium hyaline above and brown below; hymenium hyaline; paraphyses hyaline, distinct; asci clavate; spores 8, hyaline, oblong-elliptic, 1-septate, 6–9.5 × 2.5–3 μ, irregularly arranged.

The algal host is *Protococcoid*.

On limestone on an open hilltop near Yauco, Fink *1502*.

16. **Lecidea granulifera** Fink, n. sp.

Thallus thin, minutely granulose, forming a continuous, pale greenish gray to dirty white crust; apothecia small to middle-

sized, 0.6–1 mm. across, sessile, round to irregular, the disk flat to slightly convex, reddish brown or somewhat whitish pruinose, the exciple thin, colored like the disk, soon disappearing; hypothecium reddish brown; hymenium hyaline above to reddish brown below; paraphyses hyaline, stout, unbranched, semi-distinct; asci clavate; spores 8, hyaline, oblong-elliptic, non-septate, 5–6 × 2.5 μ, irregularly arranged.

The algal host is *Protococcoid*.

On rocks at 600–720 meters at Rio de Maricao, Britton and Cowell *4235*, collected in 1915.

17. **Lecidea gymnocarpa** Fink, n. sp.

Thallus thin and smooth to thicker and somewhat rough about the apothecia, white to brownish; apothecia minute, 0.1–0.2 mm. across, semi-immersed to superficial and adnate, round, the disk flat, brownish black to black, the exciple very thin, colored like the disk and soon disappearing; hypothecium and hymenium hyaline; paraphyses hyaline, unbranched or rarely branched toward the apices; asci broadly clavate to sub-pyriform; spores 8, hyaline, ovoid, non-septate, 6.5–8 × 4.5–5 μ, irregularly arranged.

The algal host is *Protococcoid*.

On exposed roots of cocoanut palm near Naranjito, Fink *345*.

18. **Lecidea prolifera** Fink, n. sp.

Thallus thin to moderately thick, rough, minutely granulose, greenish gray to ashy; apothecia small to large, 0.5–1.5 mm. across, adnate, the disk flat to slightly convex, reddish brown to brownish black, the exciple colored like the disk and sometimes disappearing, small apothecia proliferating from the larger old ones and resting upon them, the old exciple, hypothecium and hymenium persisting; hypothecium dark brown; hymenium hyaline below and sometimes brownish above; paraphyses hyaline, unbranched; asci clavate; spores 8, hyaline, oblong-elliptic, non-septate, 12–14 × 7–8 μ, irregularly arranged.

The algal host is *Protococcoid*.

On trees, Indiera Fria, near Maricao, Britton, Cowell and Brown *4397*, collected in 1915.

19. **Lecidea Zahlbruckneri** Fink, n. sp.

Thallus rather thick, ashy gray to pale lead-colored, chinky-areolate, more or less scattered; apothecia minute to small, 0.2–0.6 mm. across, partly immersed in raised areas of the thallus, the disk flat to convex, black, the inconspicuous black exciple soon

disappearing; hypothecium and hymenium hyaline; paraphyses hyaline, coherent, semidistinct; asci clavate; spores 8, hyaline, ovoid-elliptic, non-septate, 7–10 × 4–6.5 μ, irregularly arranged

The algal host is *Protococcoid*.

On rocks in an open field near Naranjito, Fink *226*.

20. **Lopadium biatorellum** G. K. Merrill, n. sp.

Thallus very thin, smooth, grayish to whitish; apothecia minute, 0.1–0.3 mm. across, sessile, the disk flat to slightly convex, dusky brown, the exciple thin, paler, soon disappearing; hypothecium dark brown; hymenium tinged brownish; paraphyses hyaline, coherent, semidistinct; asci clavate; spores 1, tinged brownish, oblong-elliptic, muriform, 13–19-septate transversely and 1–3-septate longitudinally, 50–63 × 16–20 μ.

The algal host is *Protococcoid*.

On sticks in a wood near Mayaguez, Fink *1156*.

21. **Lecanora elabens** G. K. Merrill, n. sp.

Thallus rather thick, ashy gray, squamulose-areolate, the squamules minute, sometimes indistinctly lobed; apothecia small, 0.2–0.5 mm. across, sessile, the disk concave to slightly convex, brownish to brownish black, the exciple prominent, colored like the thallus, entire to irregular; hypothecium and hymenium hyaline; paraphyses hyaline, coherent, indistinct, enlarged and brownish at the apices; asci clavate; spores 8, hyaline, short-elliptic, non-septate, 9–10 × 5.5–6.5 μ, irregularly arranged.

The algal host is *Protococcoid*.

On rocks on an open hill near Aibonito, Fink *1946*.

22. **Lecanora nigrolimitata** Fink, n. sp.

Thallus thin, composed of minute to small, greenish gray to ashy, warty granules, crowded into an irregular, chinky-areolate crust, more or less scattered toward the circumference upon a broad, black hypothallus; apothecia small to middle-sized, 0.3–0.8 mm. across, adnate to sessile, round to irregular and crowded, the disk concave to flat, black, the exciple colored like the thallus, thin, entire to crenulate, very rarely disappearing; hypothecium and hymenium hyaline; paraphyses hyaline, unbranched and free; asci clavate; spores 8, hyaline, oblong-elliptic, non-septate, 12–14 × 7–8 μ, irregularly arranged.

The algal host is *Protococcoid*.

On rocks in a valley, Desecheo Island, Britton, Cowell and Hess *1650*, collected in 1914.

23. **Lecanora portoricensis** Fink, n. sp.

Thallus thin, closely adnate, in round to irregular areas, becoming chinky-areolate and sometimes disappearing toward the center, distinctly lobed toward the circumference, yellowish to ashy; apothecia minute to small, 0.2–0.5 mm. across, adnate, the disk flat to slightly convex, black, the exciple thin to thick, colored like the thallus; hypothecium and hymenium hyaline; paraphyses hyaline, unbranched or branched toward the enlarged and sometimes colored apices; asci broadly clavate; spores 8, hyaline, elliptic, non-septate, 12–14 × 4–5 μ, irregularly arranged.

The algal host is *Protococcoid*.

On limestone at Morrillos de Cabo Rojo, Britton, Cowell and Brown *4728* and *4729* (type), collected in 1915.

24. **Buellia Finkii** G. K. Merrill, n. sp.

Thallus moderately thin, sordid greenish gray, rough and scurfy, becoming chinky-areolate; apothecia small to middle-sized, 0.3–0.8 mm. across, sessile, the disk flat to strongly convex, black, the exciple black, rather thick, finally disappearing; hypothecium reddish brown with a hyaline zone above; hymenium hyaline; paraphyses hyaline, coherent, semidistinct; asci clavate; spores 8, brown, oblong-elliptic, 1-septate or rarely 3-septate, 15–21 × 8–11.5 μ, irregularly arranged.

The algal host is *Protococcoid*.

On rocks on an eastward exposure at an altitude of 2100 feet, near Aibonito, Fink *1884*.

Buellia substigmatea Fink, n. sp.

Thallus thin, rough, composed of minute to small, greenish gray to ashy granules, crowded into a more or less continuous, chinky-areolate crust; apothecia minute, 0.05–0.2 mm. across, numerous, adnate to sessile, round to irregular, scattered or clustered, the disk flat to convex, black, the exciple thick, colored like the disk, sometimes disappearing; hypothecium dark brown; hymenium hyaline below and tinged brownish above; paraphyses hyaline, unbranched; asci clavate; spores 8, brown, elliptic, 1-septate, 10–14 × 5–6 μ, irregularly arranged.

The algal host is *Protococcoid*.

On rocks of rocky hill, Christiansted, St. Croix, Britton, Britton and Kemp *79*, collected in 1923.

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MYCETOZOA FROM JONES BEACH STATE PARK

ROBERT HAGELSTEIN

Long Island, in the State of New York, is fringed on the south by a series of ocean beaches, the best known of which are Coney Island, Rockaway Beach, and Long Beach. East of Long Beach, and separated therefrom by Jones Inlet, is Jones Beach. Part of this is now a State Park and connected with the mainland of Long Island by a causeway extending over five miles of intervening water and meadow. The beach otherwise is completely surrounded by water and is about thirteen miles long. It is very narrow, in some places only a few hundred feet wide, the greatest width being less than one mile.

This narrow sandy waste, with low beach vegetation, has no trees, and would seem to be a poor place for the development of the Mycetozoa. However, they may be found in sheltered spots usually close to the sand where moisture is retained; but the fruitings are not so numerous nor as large as in more favored locations.

The writer has a summer cottage in the colony known as High Hill Beach which colony is within the limits of the State Park. Three-quarters of the species enumerated have been found within a few hundred feet of this cottage, on decaying grasses close to the sand, on partly buried driftwood, paper, clothing, and other rubbish strewn about the beach. Similar habitats, also logs, boards, dead herbaceous stalks, and bayberry leaves, at other points within a short distance, have provided the remaining species.

The collections have been made over a limited area for several years past. It is probable that more extended search over this and similar beaches may yield other interesting forms. Seven of the fifty-eight species and varieties recorded have not been found by the writer on the mainland of Long Island.

The writer is deeply indebted to Miss G. Lister for the determinations and verifications mentioned in this paper, and for the

many freely expressed comments on specimens sent to her at various times; also, to Prof. Thomas H. Macbride and Dr. William C. Sturgis for aid so frequently extended, which has made possible a better understanding of this interesting group.

1. ARCYRIA CINEREA (Bull.) Pers.

Common on partly buried driftwood and boards. The sporangia of one fruiting are somewhat clustered, approaching var. *digitata* (Schw.) G. Lister, and a distinctly yellow variety of the typical form was found twice. Numerous fruitings of minute, scattered sporangia occur on decaying grasses. These are subglobose or ovate in shape and sometimes pinkish in color.

2. ARCYRIA DENUDATA (Linn.) Wetts.

Common on wood and paper rubbish.

3. ARCYRIA INSIGNIS Kalchbr. & Cooke.

On grasses and dead stalks in September; well distributed and abundant. The var. *dispersa* described by the writer (Mycologia **21**: 298. 1929) occurred again at various places in 1929.

4. ARCYRIA NUTANS (Bull.) Grev.

On dead wood.

5. ARCYRIA POMIFORMIS (Leers) Rost.

Common on driftwood.

6. BADHAMIA FOLIICOLA Lister.

Collected on dead grasses in July and September 1928 and September 1929. The species has also been found at other places on Long Island, so apparently is not rare. It is distinguished from others with which it may be confused by the short, yellow, filamentous stalks and the free spores, when these characters are present. Frequently the sporangia are sessile, or the spores show a tendency to adhere, but as the species forms small plasmodia with numerous fruitings, it is not difficult to find typical examples. The original determination was made by Miss Lister and she has verified one of the Jones Beach collections.

7. CERATIOMYXA FRUTICULOSA (Muell.) Macbr.

The type form and the var. *flexuosa* Lister are abundant, on decaying driftwood, during the early summer months.

8. COMATRICHA ELEGANS (Racib.) Lister.

Specimens of this species with depressed globose sporangia, but characteristic capillitium were found on the inner side of the weathered boards of an old structure, in company with *C. nigra* to which it is related. About thirty species of Mycetozoa were collected in, on, and immediately surrounding this structure which was about six feet square and four feet high.

9. COMATRICHA LAXA Rost.

On dead wood.

10. COMATRICHA NIGRA (Pers.) Schröt.

Not uncommon on old wood.

11. COMATRICHA PULCHELLA (Bab.) Rost.

On dead beach grasses.

12. COMATRICHA TYPHOIDES (Bull.) Rost.

On driftwood.

13. CRATERIUM LEUCOCEPHALUM (Pers.) Ditmar.

A beautiful fruiting of var. *scyphoides* (Cooke & Balf.) Lister was found on horse dung and the surrounding grass in July 1928. The typical form and var. *cylindricum* have not been seen on the beach, although they are common in other parts of Long Island. The var. *scyphoides* was verified by Miss Lister.

14. CRIBRARIA ARGILLACEA Pers.

Abundant in August 1928 at various stations on partly buried wood.

15. CRIBRARIA INTRICATA Schrad.

Rare; but the var. *dictydioides* (Cooke & Balf.) Lister is more abundant. Perfect developments of the variety as found on the beach seem to confirm its specific position as maintained by Macbride and other students.

16. CRIBRARIA MINUTISSIMA Schw.

This species, beautifully matured, appeared on a prostrate telephone pole under bayberry bushes in July 1928, and has not been collected by the writer elsewhere on Long Island. The determination was verified by Miss Lister.

17. CRIBRARIA TENELLA Schrad.

On wood; the var. *concinna* G. Lister also occurs. The determinations are based on the interpretations of the species as expressed by Miss Lister and Dr. W. C. Sturgis.

18. CRIBRARIA VULGARIS Schrad.

On dead wood.

19. DICTYDIUM CANCELLATUM (Batsch) Macbr.

Observed frequently on driftwood during the summer months. The var. *fuscum* Lister with small brown sporangia and distinct cup, was collected twice. This seems to be the same as var. *cancellatum* Macbr.

20. DIDERMA EFFUSUM (Schw.) Morg.

Common on bayberry leaves in the thinly effused phase and the rounded sporangia or plasmodiocarps. The latter are var. *reticulatum* Rost.

21. DIDERMA RADIATUM (Linn.) Morg.

Represented by a single collection of var. *umbilicatum* (Pers.) Meylan.

22. DIDERMA SIMPLEX (Schröt.) Lister.

Collected repeatedly on dead grasses and bayberry leaves in July 1928.

23. DIDYMIUM CLAVUS (Alb. & Schw.) Rab.

Common on grasses and bayberry leaves. The determination was confirmed by Miss Lister.

24. DIDYMIUM MELANOSPERMUM (Pers.) Macbr.

Two fruitings of small, depressed, sessile sporangia, frequently confluent and forming plasmodiocarps, are doubtfully placed with var. *minus* of this species. The spores are thick-walled, purple-brown in color, and measure 9 to 9.5 μ; the absence of a columella indicates a relationship to *D. clavus* in whose company the specimens were found.

25. DIDYMIUM SQUAMULOSUM (Alb. & Schw.) Fries.

On corrugated box rubbish. One specimen of otherwise normal stipitate sporangia shows a number of curious cylindrical plas-

modiocarps from 2 to 4 mm. in length, and with recumbent stalks at each end which extend through the plasmodiocarps and are connected as continuous, solid columellae.

26. ENERTHENEMA PAPILLATUM (Pers.) Rost.

Developed twice in successive years on the inner wall of the old structure previously mentioned.

27. FULIGO SEPTICA (Linn.) Weber.

Large aethalia are frequent on old rubbish and corrugated paper boxes, the last a modern habitat. Small aethalia, from 2 to 3 cm. in size, are on grasses.

28. HEMITRICHIA CLAVATA (Pers.) Rost.

On dead wood.

29. HEMITRICHIA SERPULA (Scop.) Rost.

On cotton textile debris.

30. HEMITRICHIA VESPARIUM (Batsch) Macbr.

On cotton textile debris.

31. LAMPRODERMA SCINTILLANS (Berk. & Br.) Morg.

Frequent in July and August on decaying beach grasses. Some developments have sporangia normal in size with short stalks, but in most cases the sporangia are minute on relatively long stalks. Sporangium size .15 to .3 mm.; total height .6 to .7 mm. One fruiting was on the claw of a dead crab.

32. LINDBLADIA EFFUSA (Ehr.) Rost.

Appeared at several places in July 1928 and again in 1929, the best developments in large effused aethalia, on old clothing partly buried in sand, and in close proximity to several fruitings of *Cribraria argillacea.*

33. LYCOGALA EPIDENDRUM (Buxb.) Fries.

On dead wood and cardboard.

34. OLIGONEMA NITENS (Lib.) Rost.

A single small fruiting on wood.

35. OPHIOTHECA VERMICULARIS (Schw.) Macbr.

This is the most abundant species on Jones Beach. In August and September it develops everywhere on dry herbaceous stems.

36. PHYSARUM BOGORIENSE Racib.

Typical sporangia and plasmodiocarps of this species were found on decaying grasses in September 1928. The determination was confirmed by Miss Lister.

37. PHYSARUM CINEREUM (Batsch) Pers.

On paper rubbish and leaves during July. Macbride gives the spore size in this species as from 6 to 7 μ. This does not apply to specimens from Long Island where the species is extremely abundant and the spores invariably much larger, from 8 to 10 μ or more and usually almost smooth. The spores from the Jones Beach paper gathering are 9.5 to 11 μ in diameter, pale, and almost smooth.

38. PHYSARUM COMPRESSUM Alb. & Schw.

On banana stems; July.

39. PHYSARUM GALBEUM Wingate.

On grasses and bayberry leaves. The species is probably not uncommon as it has been collected frequently in other parts of Long Island, but it is inconspicuous and difficult to find, the small fruitings consisting rarely of more than a dozen sporangia. The dense, almost lime-less capillitium varies considerably in color, from distinct yellow to pale, almost hyaline.

40. PHYSARUM MAYDIS (Morg.) Torrend.

On dead grasses. Determined by Miss Lister.

41. PHYSARUM MELLEUM (Berk. & Br.) Mass.

Common on bayberry leaves and stalks, in September.

42. PHYSARUM NUTANS Pers.

On dead wood.

43. PHYSARUM PUSILLUM (Berk. & Curt.) Lister.

On the stems and leaves of a living plant; September.

44. PHYSARUM VIRIDE (Bull.) Pers.

Common on wood; var. *incanum* Lister also occurs.

45. STEMONITIS FUSCA Roth.

Not uncommon on drift wood.

46. STEMONITIS SMITHII Macbr.

On cotton textile debris. The small sporangia and the constant habit of forming small plasmodia seem to the writer sufficient to separate this form specifically from *S. axifera*.

47. STEMONITIS SPLENDENS Rost.

During the early summer of 1925, two irregular forms appearing superficially like *S. splendens* but more rusty in color, were found on widely separated logs thrown up by the tides. The spores are alike, 7 to 8 μ in diameter, light in color, and warted. The sporangia of one specimen have meagre capillitia with no surface nets. The columellae are weak so that eventually the sporangia collapsed into a mass of spores. This is var. *flaccida* (Morg.) Lister.

The second specimen has strong stalks and columellae, sparse capillitia, but well developed surface nets with large meshes up to 150 μ in width, and is var. *Webberi* (Rex) Lister.

For the present, these forms are considered as varieties of *S. splendens*.

48. TRICHIA PERSIMILIS Karst.

Large fruitings of this common species were taken from an old cotton mattress on the sand.

49. TRICHIA VARIA Pers.

On dead wood.

50. TUBIFERA FERRUGINOSA (Batsch) Gmel.

A common species found everywhere on decaying driftlogs.

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NOTES AND BRIEF ARTICLES

Mr. Carl C. Lindegren, teaching fellow of the California Institute of Technology at Pasadena, California, spent the month of July at the New York Botanical Garden where he pursued his genetical studies on the species of the Monilia molds belonging to the Ascomycete genus *Neurospora*.

LAMPRODERMA CRIBRARIOIDES (Fries) R. E. Fries. This striking alpine species, characterized by its large, dark, strongly reticulate spores is represented by a generous collection on herbaceous stems, gathered at Middle Boulder, Colorado, by Fred J. Seaver and Paul F. Shope (No. *40*) in the late summer of 1929. It is known from a number of localities in Europe but this seems to be its first recorded occurence elsewhere.—G. W. MARTIN.

Dr. B. O. Dodge, Pathologist at the New York Botanical Garden, is attending the International Botanical Congress held at Cambridge, England. He is taking part in a symposium on the significance of heterothallism and hybridism in fungi, and is reading a paper on Inheritance of the Albinistic Non-conidial Character in Interspecific Hybrids in *Neurospora*. He will spend some time traveling in Europe visiting various culture laboratories where he will make some studies on the fungi causing human diseases. He expects to return to New York about the middle of October.

A brief paper on Cytological Features of the Life History of *Gymnosporangium Juniperi-virginianae* by Miss Edith Stevens appeared in the June number of the Botanical Gazette. It is interesting to note that the figures and descriptions of the origin and development of the teliospores include a description of buffer cells as terminal cells of the parenchymatous growth of the young sorus, the teliospore proper arising from a subterminal cell. There is nothing in the paper to indicate that the presence of buffer cells in the telial sorus of these forms is not reported for the first time.

It might be pointed out, however, that buffer cells in telial sori of the *Gymnosporangia* were first described and figured in the Brooklyn Botanical Garden Memoirs (**1**: 128-140, 1918). One of the figures describing these structures has been copied in such works as Arthur's Plant Rusts. The telial sorus of *Gymnosporangium Juniperi-virginianae* was also described and figured in Mycologia (**10**: 182–193, 1918), where a full plate illustration of the young sorus of this species showing continuous rows of buffer cells will be found. Buffer cells in the sori of *G. clavipes* are described in the in the American Journal of Botany **9**: 354–365, 1922. Buffer cells in the telial sorus of *G. bermudianum* are also noted by Thurston in a paper published in the Botanical Gazette (**75**: 236, 1923).—B. O. DODGE.